THE ENGINEERING AND MINING JOURNAL.

VOL. XXIII. No. 15.

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NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. Articles written by Mr. Raymond will be signed thus * Those written by Mr. Van Wagenen will be signed ‡.

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"THE ENGINEERING AND MINING JOURNAL" ADVOCATES THE ADOPTION OF THE METRIC SYSTEM OF WEIGHTS AND MEASURES,
and urges all who are interested in the simplification of our present complicated and unsatisfactory systems to aid, by their active sympathy and encouragement, the early introduction of this much needed reform.

Our Western advertisements from the *Mining Review* were not received in time to appear in this Number of the JOURNAL.

SPELLING AND PRONUNCIATION OF THE METRIC NOMENCLATURE.

A committee of the Boston Metric Bureau, assisted by a committee of the American Metrological Society, and a number of eminent authorities, has reported the following as the most desirable spelling and pronunciation of the metric nomenclature. These correspond with those used in the United States Government reports, and it is to be hoped that they will be generally adopted :

Spelling.	Pronunciation.	Abbreviation.
Meter (meeter)	like gas meter	m.
ar (ar)	" are	a
liter (leeter)	" pique	l.
gram (grăm)	" dram	g.
deci (dĕsĭ)	" decimal	d.
centi (sĕntĭ)	" cent	c.
milli (mĭlĭ)	like mill	m.
deka (dĕka)	" decalogue	D.
hekto (hĕktō)	" hecatomb	H.
kilo (kĭlō)	" chiliad	K.
myria (mĭrĭa)	" myriad	M.

To abbreviate the compounds pronounce only the first two syllables, saying centim, millim, decil, hectog, etc.

THE GROWTH OF THE ENGINEERING AND MINING JOURNAL.

Those of our readers who will compare this number of the ENGINEERING AND MINING JOURNAL with one of about three years ago will not need to be told of its growth and improvement. In a period of unparalleled business depression, and one especially disastrous to newspaper enterprise, the ENGINEERING AND MINING JOURNAL has found exceptional prosperity; the steady increase in its circulation and advertising having called for three separate additions to its pages, till now its regular issue contains twenty-eight pages, with frequent additions of double-page illustrated supplements.

Somewhat more than a year ago the JOURNAL acquired the *Coal and Iron Record*, of this city, thereby widening and strengthening its position with producers, dealers and consumers of coal and iron. The space it had necessarily to give to the great coal and iron industries to maintain the pre-eminence it sought and had gained, left too little room for the gold and silver interests of the West. This was of less importance while mining investments received but little attention here; but since, within the past few months, they have commenced to attract a large share of public attention, and will doubtless soon become favorite investments for our capitalists, we have decided to develop that department of the ENGINEERING AND MINING JOURNAL and have made arrangements by which we enlarge and incorporate with it the *Mining Review*, of Denver, Colorado) by far the ablest and most influential mining paper in the West). We have been so fortunate as to secure the efficient services, as staff correspondent, of Mr. T. F. Van Wagenen, the able editor of the *Mining Review*, a skillful and reliable mining engineer, quite familiar with the mines and mining regions of the Western States and Teritories.

Mr. Van Wagenen will have special charge of the Western gold and silver mining interests, and will have associated with him in the work Mr. W. W. Rose, Jr., who will act as Business Manager of our Western office, at Denver. This consolidation adds to our already large list of subscribers that of the most widely circulated mining paper of the West, and it secures for our Western mining interests that full representation, under the supervision of an experienced mining engineer, which their importance demands. As soon as our arrangements can be completed we shall receive every Friday full telegraphic reports from Denver. This arrangement cannot fail to be of great advantage to several very large classes of our readers. In the first place, it gives the miners a reliable technical journal, in which they will find all questions of mining and metallurgy treated, by the ablest and most experienced engineers in the profession, in a manner to be of practical service to them. The appropriateness of this information to their special cases will be secured by the wide experience and residence in the mining regions of our staff correspondent. Secondly, mine owners will secure an influential medium, through which their mines will be brought to the notice of capitalists in the East and in Europe. Thirdly, capitalists, bankers, brokers, and merchants everywhere will find in the columns of the ENGINEERING AND MINING JOURNAL disinterested and trustworthy information concerning mines and mining property in every part of America, and will also receive full and reliable reports of the values of mining stocks and securities.

The manufacturers and dealers in mining machinery and mining supplies of all kinds (which includes everything used about the mines or in a mining camp), and the purchasers and consumers of these products, will be weekly introduced to each other through our advertising columns in a manner that must result in great benefit to each.

The increased attention to the gold and silver interests is to be gained by large additional expenditures in money and work upon the JOURNAL, and not at all by diminishing the space or attention devoted to coal and iron. On the contrary, we shall hereafter be able to devote more of each than ever before to these important interests.

The plan upon which the ENGINEERING AND MINING JOURNAL is managed aims at making it a thoroughly practical, scientific journal, and at the same time, and in an equal degree, a reliable, practical trade authority. Its professional departments contain the opinions and practice of the ablest specialists in mining, metallurgy and engineering, and a vast amount of other useful information given in an attractive and convenient form. Illustrations of mining, mining machinery, and appliances will form a still more prominent feature in the future than they have in the past, while its trade reports, market reports of coal, iron metals and ores, and its financial reports of mining stocks are prepared with the assistance of those best informed in each department of business treated of. In this manner, and by a policy of independence and strict justice, with no outside conflicting interests or entangling alliances, the ENGINEERING AND MINING JOURNAL has attained a reputation and influence which it values most highly. Its object is always the promotion of the best interests of mining, and the attainment of those conditions which make investments in mines safe and profitable, and it is always the uncompromising opponent of humbug and dishonesty in every form and without respect of persons. It consistently advocates the cause of the workmen, and uses its influence to promote justice and to inculcate respect for the rights of others on the part of both employers and workmen. It seeks, in a word, to promote "the economical production of the useful minerals and metals, and the safety and welfare of those employed in these industries." These declarations may seem uncalled for by our old subscribers, who are familiar with them, but it is proper that we should introduce ourselves to our numerous new subscribers, and we hope that many of those who are not already on that list will find in our paper that which will induce them to join it.

ADVANCE IN ORE PRICES AT BLACK-HAWK.

The recent advance made by the Boston and Colorado Smelting Works at Black-Hawk in the price paid for silver and gold ores is one of the signs of the times. The advance was a heavy one, and occurred in the face of much opposition by some other buyers, who claimed that the figures left no profit; but it is likely that they will be maintained during the summer at least, unless a serious decline in the value of silver bullion occurs. For the past three years this smelting company has been steadily advancing its business facilities outside of Black-Hawk, and now exercises a very strong influence in every mining camp in the State. With each new furnace built, and each improvement in handling and reducing, they have pushed up the market price for ores, till now no mineral district in the West has any better, if as good a sale for its products as Colorado.

We think the present range of prices for ores will be retained in the future permanently—at least they are not likely to be lowered—and this, not simply because of sharp competition between reducing establishments, but as a business necessity to any works located in the vicinity of the mines. So far as Colorado and Utah are concerned, Eastward-bound freight is so cheap and ores of the precious metals are so eagerly sought for by Mississippi Valley smelting works, that our home works, in order to handle high grades, must pay nearly as much for them as the Eastern works offer. This can only be done by establishments operating on a large scale, and working for the more common base metals as well as the precious ones. Consequently the tendency is for the concentration of capital in smelting works, and the accumulation of ores at centres where fuel and labor are cheap, and ores may be so mixed as to flux themselves. This condition of affairs has gradually been growing on Colorado, and a point is now reached where, for almost all classes of mineral, our home market is better than the foreign one. This is shown by the fact that but a very small quantity of ore is now going Eastward—about four carloads per week against seven carloads two years ago—and all that is going out of the Territory is rich galena, generally the product of concentration works. In another year it is likely that this shipment also will cease, as the Black-Hawk works, we believe, are making preparations (if they have not already begun) to buy and smelt lead ores.

The general effect of this movement will be the gradual extinction of small smelting works, and the substitution of dressing and separating establishments in all parts of the State, not too inaccessible or remote. It is a sure sign of the passage of the industry from the experimental to the mature stage of development, and a direct result of sound business management and scientific ability in the reduction of ores, as compared with the rude and untrained efforts of the earlier days. ‡

THE TELLURIUM MINES.

Many of the hasty and ill-advised ventures that were made last Spring in the Tellurium Belt, in Boulder County, Colo., have come to grief during the past season, and it has become fashionable among the croakers to decry that district and declare its veins worthless. There is a lull doubtless in the unnatural excitement which accompanied the opening of the Magnolia, Sunshine and Ballarat mines, and even the best friends of those districts, and the most thorough believers in their worth, are forced to acknowledge a state of affairs anything but encouraging. We think, however, that a careful examination of the actual state of the mines, and of the excitement attendant on their opening, will furnish not only a good reason why those districts are dull just now, but cause for surprise that their flush days continued so long.

When telluride of gold was first discovered in 1872, almost nothing was known of the ore in the West, except the one fact that it assayed well up in the thousands. It was thought by the majority of mining men that the ore would be found in large and regular seams, of a uniform high grade, and that it would be as easily reduced as any other mineral. Consequently a large number went into mining with no provision except for the production of rich mineral, and no expectation of finding a poorer grade. It was soon found, however, that the valuable pockets were comparatively small in size and few in number, and that, as in every other mineral district, the lean ores were vastly the more plentiful. Immediately on this discovery a number of patent processes sprang into existence for the treatment of second and third class rock, none of which were based on correct metallurgical principles or ordinary common sense. The testing of these processes absorbed a large amount of capital, and the disgust produced by their failure bred much of the distrust now felt regarding the mines. One by one promising mines were abandoned for want of means for development, and others that had paid enormously at first ran into lean ground, and frightened their owners into a cessation of work. This was the state of affairs last fall, when in reality the condition of the several districts was much worse than at present, though not generally recognized as such.

Just at this point, however, when owners were concealing the true state of affairs, and the papers were doing their best to bolster up the various camps, attention was drawn to the subject of concentration, and since that time the work of experimenting on the telluride ore has proceeded with great steadiness and perseverance, till at present there appears to be no doubt of complete success in working the poorer classes of ore in the near future.

We can see, therefore, no reason for any distrust of our telluride mines. Experience has taught the miners that the veins are in no respect different in structure from those of other districts, that the distribution of ore is not anomalous, and that, as in all metalliferous mines, the poorer grades are in abundance, while the rich rock is scarce. This fact once appreciated, the miners of Boulder Co. may renew their work with full confidence in the true worth of their prosperity. Such developments as have already been made have thrown thousands of tons of ore ranging in value from $30 to $70 per ton on the dumps, from which it is possible to win many times more than has been expended. The mines once opened so that production may be carried on economically, and with facilities for utilizing all rock worth over $30 per ton, those who are now disgusted with the outlook will have cause to regret their faint-heartedness, and find opportunity to make up their minds once again as to the prospects for the future, while those who hold on will, we believe, have no necessity to regret their choice. ‡

THE UTAH NORTHERN RAILROAD EXTENSION.

The proposition of the Montana legislature to pay $1,700,000 in bonds to the Union Pacific, for 380 miles of railroad work, from Corinne to Helena, was declined by the latter corporation on the 25th of March, and again the citizens of that growing and enterprising Territory must settle down to the consciousness of at least another year's delay in the opening of their favored mineral districts. For the last six seasons the prospect of rail communication with the rest of the world has been continually before them, and nothing but a thorough belief in the great wealth of the country has compensated for the tedious delay. It is much to be regretted that this last move has been a failure, for of all since the cessation of work on the Northern Pacific it has excited the most hope.

There will be no delay, however, in the development of Montana mines on this score. People left to themselves to help themselves seldom fail to accomplish the ends sought, and already the quartz mining industry of Montana has reached a point where any appreciable retarding of its growth is impossible. If the territory depended on its placers alone for life, the case might be different; but it has been found possible and profitable to mine and reduce both silver and gold ores at home, and this work will not cease. In addition, the Dry Concentration Works of the Montana Company, at Jefferson, lately opened, inaugurate a new and very promising field of work, which, in the end, will do more towards compelling the trans-continental line to build into Montana than double the quantity of bonds lately voted and declined. We note that the *New North-West*, which is by far the best paper in Montana, and among the most carefully edited in the West, takes a very sensible and hopeful view of the situation, and encourages the investment of home capital as the most certain way of forcing the building of a road into the Territory by another season.

CHINESE PORCELAIN CLAYS.

TO THE EDITOR: SIR—In your last issue (March 31) I notice that, in reviewing Prof. Wurtz's "Report on Japanese Porcelain," you say: "Perhaps the most striking result of his work is the discovery that Japanese and Chinese fine porcelains, contrary to our traditional conceptions, are not formed of clay at all, but of a purely silicious rock mineral or petro-silex." If you will refer to the *American Journal of Science and Art* for March, 1871, page 181, you will find, in a paper by Baron Von Richthofen, "On the Porcelain Rocks of China," the following:

"I have to record the unexpected fact that the material from which the porcelain of King-te-chin is made is taken from certain strata intercalated between these slates, and occurring at several places, separated from each other laterally, that is, at angles with the strike of the rocks. It is a rock of the hardness of feldspar (inferior kinds are not so hard), and of a green color, which gives it in some measure the appearance of jade, to which the Chinese, too, compare it. This rock is reduced, by stamping, to a white powder, of which the finest portion is ingeniously and repeatedly separated. This is then molded into small bricks. The Chinese distinguish chiefly two kinds of this material. Either of them is sold in King-te-chin in the shape of bricks, and as either is a white earth, they offer no visible differences. They are made at different places, in the manner described, by pounding hard rock, but the aspect of the rock is nearly alike in both cases. For one of these two kinds of material, the place Kao-ling ('high ridge') was in ancient times in high repute; and, though it has lost its prestige since centuries, the Chinese still designate by the name "Kao-ling" the kind of earth which was formerly derived from there, but is now prepared in other places. The application of the name, by Berzelius, to porcelain *earth* was made on the erroneous supposition that the white earth which he received from a member of one of the embassies (I think, Lord Amherst) occurred naturally in this state. The second kind of material bears the name Pe-tun-tse ('white clay')."

I am unable to ascertain that he has published anything further on the subject. Prof. Wurtz's researches are in nowise detracted from in value by this prior discovery, which thus is evidently to be credited to Von Richthofen.

UNIVERSITY OF WISCONSIN, April 3, 1877. R. D. I.

Our correspondent is quite correct. The omission to credit Von Richthofen was through our inadvertence.

NOMENCLATURE OF STEEL.

By Adolf Schmidt, Ph. D.

The paper of Mr. Greiner in the 3d of March number of the ENGINEERING AND MINING JOURNAL recapitulates once more the principal points made in favor of the so-called "new definition" of steel. I have published of late two papers and a letter on this subject in the *Berg- und Huttenmannische Zeitung*, 1876, No. 43, p. 360; No. 48, p. 408, and No. 52, p. 445. These publications sufficiently refute Mr. Greiner's arguments.

There is, however, one point comparatively new and very neatly expressed by Mr. Holly's words: "The determination of previously unknown intermediate forms and functions is constantly changing all systems of classification." This remark is perfectly correct. But such a change of definition should only be made, and is generally made, by a gradual alteration, corresponding to the gradual development of actual circumstances, and not by a complete and sudden overthrow of the old and universally accepted definitions. I have shown in the first of the above-mentioned publications that there is no very great objection against including all molten carburets of iron in the general term "steel," because melting imparts to these carburets certain qualities which count among those most characteristic of steel. This extension of the definition of steel is by no means the greatest defect in the new definition. Its truly weak point is, that it attempts to *exclude* from the term "steel" certain materials, which are steel in every sense of the word, although they have never been molten. Any man, and be he a Bessemer-man, who has seen the fracture of a piece of Styrian or Carinthian hearth steel or of first class Rhenish puddled steel, cannot pretend that these products are less "homogeneous (in whatever sense one may take this expression) or less pure than Martin steel or Bessemer steel, and it can not be reasonably expected that these and similar products should ever be called "wrought iron" in the manufacture or in the trade.

Mr. Holley justly designates the majority of the soft, molten carburets of iron as "previously unknown intermediate forms." If these carburets are *new*, why not give them a *new* name? If they are *intermediate*, why not call them so as to indicate this *intermediate* position? Why insist on the vain attempt of calling them *exclusively* by the old term "steel" which was used heretofore for something else? This attempt is the only cause of the whole present confusion in our nomenclature.

As these new products are "intermediate" between steel and iron, we might call them either by the one or by the other name, provided that we add some expression that will indicate their intermediate position, so as to distinguish them from steel proper and from wrought iron proper. The question whether they should be called steel or iron is already practically decided. They are generally known as Bessemer *steel*, Martin *steel*, etc.

All these products have a steely structure as well as various other qualities of true steel. But they do not harden, or at least their capacity for hardening is variable and is, with regard to the practical uses they are mostly put to, in a certain measure indifferent. They are, therefore, not steel proper, but they are what Mr. Holley has so well designated as "structural steel," that is, steel by structure.

This happy expression seems to me well adapted to designate these intermediate products. By adopting it we would obtain the following classification of malleable carburets of iron:

Hardening and of steely structure	Steel proper.
Not hardening, but of steely structure	Structural steel.
Not hardening and not of steely structure	Wrought iron.

This classification is the natural result of the modern development of the iron manufacture. It does not overthrow the old definition of steel, and yet leaves to the new intermediate products the name of steel, which they have received in practice, and which in many respects they deserve. It also avoids involving the mode of manufacture, as a general classification always should, because, if certain kinds of steel can be be made to-day after a certain method only, there

is no telling whether, at some future time, products with exactly the same properties may not be made by some other method.

The above classes of malleable iron carburets may be subdivided, according to their mode of manufacture, as follows:

Steel proper	Weld steel	Example:	Hearth steel.
	Ingot steel	"	Crucible steel.
Structural steel	Weld steel	"	Puddled steel.
	Ingot steel	"	Bessemer steel.

Wrought iron or "Weld Iron" will have no subdivision.

It will be noticed that this classification also agrees with the one proposed by the International Commission, the only difference between the two being the dropping in the former of the subdivision "Ingot Iron," which subclass does not seem to be required at present, although it may be in some future time. This class is united with the class "Ingot Steel," with which it is so closely connected that in the present manufacture and trade both are actually considered and treated as one.

The whole classification, as above developed, will suit all practical purposes, and is in no manner in opposition to the accepted theories. The only defect I can see in it is that it is theoretically somewhat less strict, not to say somewhat less pedantic, than that proposed by the International Commission, which latter classification is already as good as rejected in America. I have tried to show, in my paper on the "new definition of steel" (*Berg-und Huttenmannische*, 1876, No. 43), that it must be always more advantageous to science to conform its nomenclature, as much as possible, to that once adopted in practice, than to attempt forcing entirely new classifications on the manufacture and on the trade.

HEIDELBERG, March, 1877.

NOTES ON A METALLURGICAL CAMPAIGN AT HALL VALLEY, COLORADO.*

By J. L. Jernegan, M. E., La Grange, Columbia.

(*Concluded from page 223.*)

The oxygen of the bases of the RO type amounts to 12·43, and that of R_2O_3 type to 5·02, and that of the silicic acid to 16·46. The sum of the oxygen of both types of bases is 17·45. This gives the ratio of 17.45 : 16.46 = 1·06 : 1, or nearly as 1 : 1. The slag consequently approaches as nearly to a singulo silicate as it is possible to calculate by using two places of decimals only. Since the oxygen of the bases of the RO type is to that of the R_2O_3 type as 12·43 : 5·02 = 2·47 : 1, or nearly as 2 : 1, the composition of the calculated slag may be approximately represented by the formula:

$$4Al_2O_36SiO_2 + 2RO,SiO_2.$$

The roasted ore contains 39·02 per cent. metallic lead, so there will then be used 1,130·8 limestone, and 961·2 lb. iron ore, or 2,092 lb. flux per ton of bullion produced, the more or less unavoidable loss in lead not being taken into consideration. Theoretically, the bullion would contain 148½ oz. silver per ton. Per ton of roasted ore there would be used 0·22062 ton limestone, and 0·18755 ton iron ore; or together 0·40837 ton = 816·34 lb. fluxes = 40·83 per cent. of the roasted ore; and there would be produced 1,703 lb. slag per ton ore, or 4,338 lb. = 2.169 tons, per ton bullion produced, plus the amount of old slag added to the charge.

There is 2.94 per cent. sulphur in the roasted ore, which will go to form a matte with the copper; but since there is only 1·36 per cent. of metallic copper contained in the ore to combine with the sulphur to a matte, expressed by the formula Cu_2S, there remains 2·60 per cent. sulphur uncombined, since 1.36 per cent. copper requires only 0·34 per cent. sulphur to form the salt above mentioned. This excess of sulphur would combine with lead to form Pb S, if not prevented by the addition of iron. The sulphuric acid of the sulphate of baryta would probably be partially reduced to sulphur, but as it would most likely form sulphide of barium, which would be dissolved by the matte and slag, we will not bring it into the calculation. In order to saturate the excess of sulphur, an addition of 4·55 per cent. metallic iron is necessary to form a proto-sulphide of iron per ton roasted ore. The burnt iron ore contains 65·10 per cent. free metallic iron, consequently there should be added 128·56 lb. iron ore. We thus form a matte approximating the formula:

$$Cu_2S + FeS.$$

There would be produced per ton of roasted ore smelted, 214·56 lb. matte, containing:

	Per cent.
Copper	12·67
Iron	65·59
Sulphur	21·74
	100·00

The proportion of matte formed, to bullion produced, would be as 1 : 3·6. There would also be produced a small amount of slag formed from the impurities of the iron ore added to saturate the excess of sulphur.

We now reach the following result as regards the make up of the blast-furnace charge; a charge that is intended to produce an easily fusible slag that approaches a singulo-silicate in its chemical composition, a matte containing all the copper and no lead, and a bullion carrying all the silver; a result, however, that can be achieved on paper, but not in the blast-furnace.

CALCULATED FURNACE CHARGE.

			Per cent.
Roasted ore	2,000·00	lb.	= 58·05
Limestone	441·24	"	= 12·88
Burnt iron ore	503·66	"	= 14·61
Slag from first run	500·00	"	= 14·46
	3,444·90	"	100·00
Coke	500·00	"	
	3,944·90	"	

Coke to ore as 1 : 4, and coke to charge as 1 : 6·88.

We now have for the calculated charge, and the charge used in the first run, the following comparison:

	Calculated. Per cent.	First run. Per cent.
Roasted ore	58·05	56·98
Limestone	12·88	10·87
Burnt iron ore	14·61	17·57 metallic iron taken as ore.
Slag from first run	14·46	14·58 from Alma.
	100·00	100·00

* A paper read before the American Institute of Mining Engineers, at the New York meeting, February, 1877.

It will be perceived that the charge of the first run compares quite closely with the ore calculated, with the exception of the amount of iron ore, which is in excess of that required as determined by the calculation by 2·96 per cent.

A few days after the first furnace was blown out, a second was blown in, and smelting was commenced with the following charge:

FURNACE CHARGE, SECOND RUN.

			Per cent.
Roasted ore	2,000	lb.	= 62·89
Limestone	380	"	= 11·94
Burnt iron ore	300	"	= 9·43
Slag from first run	500	"	= 15·74
	3,180	"	100·00

This charge varies from that of the first run thereby that the amount of iron ore was reduced by one-half. It produced a slag that ran well, though much richer in lead than that of the first run. Upon analysis it was found to contain 42·20 per cent. silica; it was therefore between a singulo and a bi-silicate. Slag and matte did not separate as well in the first run, and the latter also assayed higher in silver and lead. Roasted matte, containing 40 per cent. sesqui-oxide of iron, was added to the charge for a short time as a substitute for the iron ore, but as it had been roasted in stalls, and had only received one fire, it was soon discontinued on account of containing too much sulphur, and consequently made a large proportion of matte, rich both in lead and silver.

Notwithstanding the large reduction in the amount of iron ore used, and the production of a slag much more highly silicated than that of the first run, the second trial did not turn out much better than the first. The same difficulty was encountered as heretofore, *i. e.*, accretions forming above the tuyeres at about the same height as before, and this time also on the bottom of the crucible, the former preventing the charges from going down regularly. The furnace ran five days, and was then blown out. During the fore part of this run, in order to overcome, as well as possible, the excessive height of the furnace, the same was only charged to within six feet of the top, but this soon had to be discontinued, as it was found almost impossible to charge the alternating layers of fuel and ore mixture with any degree of regularity.

Thus ended the unsuccessful smelting campaign of the Hall Valley Works in the fall of 1875, affording very unsatisfactory results, similar in many respects to that experienced by almost all new undertakings in the smelting line in this country, which it would almost seem requires the going through with of one or more failures before entire success is reached.

In my opinion, the failure of these attempts at successfully smelting the Hall Valley ores may, without doubt, be attributed to the disadvantageous shape of the shaft-furnaces, and the poor quality of the iron ore used as flux. The furnaces, on account of their great height, flat boshes, and small dimensions at level of tuyeres are better suited by far for the reduction of iron ores than for the smelting of those of lead. The iron ore used as flux would undoubtedly answer its purpose well enough in furnaces of less height.

As far as making a technical success with the smelting of the Hall Valley ores, I can see no difficulty in the future, if the ores are concentrated to such a degree that their percentage of lead is sufficiently increased to insure good smelting, and the latter operation is conducted in properly constructed blast-furnaces, not over ten feet in height from center of tuyeres to feed-hole, subsequent to a thorough oxidizing and slagging roasting of the ore.

CORRECTION.

TO THE EDITOR: SIR—In Vol. XXIII., No. 12, March 24, 1877, of the ENGINEERING AND MINING JOURNAL, on page 188, under the head of "Mining Notes from the Magnolia District, Colorado," I find the following statement: "Prof. Wiser, from Georgetown, had a piece of ore from this mine analyzed by Prof. Genth, of Philadelphia, who pronounced it calaverite, showing the enormous yield of $230,000 to the ton." The whole article is signed by Messrs. Bradford & Myers. Allow me to say that these gentlemen have been misinformed, as there is no foundation in the whole statement. Yours, very truly,

F. A. GENTH.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, April 7, 1877.

THE USE OF ANTHRACITE WASTE.*

By John F. Blandy, M. E.

Although the question of the "waste of anthracite coal mining" has been so frequently discussed, and a committee was appointed at the first meeting of this Society to consider and report upon the subject, still but little progress seems to have been made in arriving at a conclusion as to how it can be reduced.

That Committee made a preliminary report at the August meeting, 1871, in which it divided the question into three parts, namely: Waste in mining, in preparing for market, and in transportation.

I shall not here refer to the first item, as so much depends upon the peculiar features of each separate mine, and the skill of those in charge; but in reference to the second, that of preparing the coal for market in breaker and screens, I wish to make some remarks. There is no use considering the question, whether the coal *should* be broken up to suit the fancy of consumers; all miners are satisfied that it should not be, but the consumers decide that they want it that way, and the miner must submit, and simply utter his maledictions upon the head of the man who first suggested a breaker and screen, if that is any consolation to him.

What is called *waste* in this process of preparation, is the *dust and fine coal*, which results from the breaking and screening, and, as we all know, this is a very important percentage of what passes from the slope to the top of the breaker. Now, if this dust and fine coal can be utilized—the slate which is picked out is not to be taken into consideration as waste—then we get rid of this item entirely. There is no question in my mind that this article can and will be used as a steam generator at least, and I think, therefore, that in depositing it away from the screens care should be taken to keep it separated from the slate which has been picked out, so as to avoid at some future day the necessity of rescreening it. At present the practice is to dump it wherever it is convenient.

Many attempts have been made to burn this material, by mixing it with portions of clay, with fine bituminous coals, or other materials as a cement, and pressing it into blocks, etc., none of which, at the present time, can be really pronounced successful—that is, sufficiently successful to be generally received as practicable—either from the fact that they are too expensive to compete with the

* A paper read before the American Institute of Mining Engineers, at the New York meeting, February, 1877.

coarser coals, or because the apparatus for using the fine coal is too complicated for the general workman.

I wish to call attention, however, to one exception in this list of trials, which is probably not known to many of our members, and has probably been forgotten by others. I refer to the "Braun furnace," which has been very successful in several instances and, from my own experience, very economical.

In the year 1867, I examined one in use in Cortlandt Street, New York, and one in Brooklyn, both of which had been running for some time upon anthracite dust, with a small admixture of pea coal, gathered from the city coal yards. Being at that time in charge of the mines at Tamaqua, Pa., I examined these two furnaces carefully, and received such satisfactory accounts of them, that I determined to try them at the Newkirk colliery. This colliery was worked out at the first lift below water level, and as it was connected with the adjoining collieries, I was obliged to keep the water out of it. Wishing to arrange all upon as economical a basis as possible, I thought that, if I could manage to run the pumps by the use of the dirt from the screen-banks, I should attain the object very successfully. For this purpose I set four plain cylinder boilers—30 inches diameter—in pairs, with a Braun furnace to each pair—the furnaces being side by side, with a partition wall. I arranged the double chamber under the boilers with the special purpose of thoroughly consuming the gas. There were two 12-inch plunger pumps, driven with gear wheels, and with a lift of about 250 feet perpendicular height. The result was a success, as I ran the pumps continuously for about eight or nine months—until the close of my superintendence—without any stoppage for repairs to the furnaces. How much longer they were in use I do not know—my successor in office took them out, but for what reason I never learned. During the time they were in my charge, no other fuel was used than that which was hauled in from the waste heap of the mines.

As the coal beds at that mine were much troubled with "*dirt faults*," the character of the "waste heaps" was by no means of the best, and far from pure coal. The result was such as to fully satisfy me that all the engines about an anthracite colliery can be run upon this material, and, therefore, the small coal which is now used for that purpose could be sent to market. Certainly in this way a large amount of what is now called *waste* could be avoided, and if successfully and generally used at the mines, it would soon find its way into use elsewhere. The question resolves itself, therefore, not into one of preventing the making of dust and fine coal, but into one of how to consume it when made.

The furnace, as then constructed, is open to improvements, especially in the method of feeding the fires, but in its main features it is correct, easily managed, not nearly as laborious as the ordinary fire, and little liable to repairs.

In the ordinary construction of the fire-box of stationary boilers, the main item of cost for repairs is in grate-bars, as in burning the refuse and small coal at anthracite mines there is such a large amount of hard cinder and clinker that the bars are soon destroyed. In the Braun furnace this is not at all the case, as I have seen bars taken from it, after many months of use, that were as good and clean as when put in new. The reason of this is that the hot coals—if the fire is properly handled—never come in contact with the bars; they act simply as screens to let the ashes through—care always being taken to leave them covered with a good bed of ash, which can be easily done without interfering with the draft. The main feature of the furnace is the vaulted fire-brick roof over the fire, which, acting as a reflector of the heat, keeps the top of the coal in a glow, and as the draft can be admitted through the doors equally as well as through the grates, the slight draft through the bars prevents the forming of hard cinder. By the proper regulation of the draft over the fire a more perfect combustion of the gases takes place.

The whole construction of the furnace is very simple, and any ordinary workman can soon be taught to handle it. I cannot now tell the cost of it, but it is but little, if any, more than the ordinary method. In these respects it commends itself to general use, and, as I stated above, there should be no trouble in its adoption, at least at all the mines.

The result might be that many improvements might be made upon it or furnaces of a similar construction, and the final result be the elimination of this item of "waste in preparation," and a great benefit attained for both landlord and tenant.

TECHNICAL EDUCATION.*

By Lewis M. Haupt, Prof. of Civil Engineering, Towne Scientific School, University of Penn.

It has given me great pleasure to read, in the papers recently published by this Society, the discussions on the subject of Technical Education, which were developed at the joint meeting held at the Franklin Institute in June, 1876; and since it was impossible for me to be present, I desire to improve this my first opportunity of adding the weight of my testimony and experience to what has been so ably presented by others.

It is a subject about which the people need to be kept agitated, that their views may expand with the demands made for a higher and more thorough education. It is the public at large, the capitalist, the manufacturer, and the laborer, who are to be benefited more or less by this elevation of the standard of our professional schools, and it is but just, therefore, that the schools should look to them for the means with which to accomplish so desirable an object.

It is no doubt to the interest of a metallurgist to employ a skilled laborer who will prevent waste by properly proportioning his materials; by regulating the supplies of air and fuel; by arranging his plant in the most economical manner, and by disposing of his products to the greatest advantage. The engineer is benefited by selecting for an assistant a person able to determine the values of his factors of safety for the same materials in different forms and positions, avoiding expensive suits for damages and cost of reconstruction; he should be able to so locate a road as best to fulfill the requirements of a through traffic, and yet develop local industries. But I need not multiply instances to show what all will readily concede, viz.: the advantages of a *theoretical* education; that was fully demonstrated at the previous special meeting, but it is still an open question as to whether the practical instruction should precede, accompany, or follow the theory.

In carefully canvassing the opinions of the members who committed themselves on this subject, I find that *eight* were inclined to favor the first arrangement, *twelve* the second, and *eight* the last—giving a plurality in favor of the synchronal combination of the two departments of study of thirty-three per cent. over either of the other systems. Most of the advocates of this middle course are men of experience in both practical work and professional duties, and whose faith in the ability of the schools to make it a practical success is founded upon their knowledge of the requirements of both theory and practice.

Numerous precedents are established in the technological schools of Russia, Germany, France, England, Sweden, and other countries; and so decided has been the impression made in this country by the exhibits of such institutions at the late Exhibition, that many of our instructors and their enterprising boards of trustees are using every effort to modify their rosters so as to embrace as large a proportion of practical work as possible in their curricula.

A combined course conforms to the order of nature. From the very inception of knowledge, the sound or name and the thing are associated; the senses and mind are co-laborers—the first to glean, the second to direct, arrange, digest and utilize the information thus obtained. The mind and hand are essential to the engineer, and they are constantly called upon to assist each other, and this interpreter of the mind, the hand, gives exact expression to the imaginative and inventive faculties in the only universal language, that of form, as exemplified in drawings. But that the mind may direct the hand intelligently, it must itself be cultivated, and thus taught to know what is right or wrong, good or bad, safe or unsafe, practical or visionary, and such knowledge can only be obtained by an intimate association with materials and tools, and the methods of using them by which is developed their physical properties.

To educate the mind simply by reading, as in a purely theoretical course for a number of years, and then to develop the practical requirements of one's nature, is abnormal, and a waste of time: the two assist each other by giving substance to the idea and weight to the formulas that may be used.

Another important consideration is the physical benefit conferred by a small amount of labor. The diligent student, without exercise, may graduate well, but it will be with an impaired constitution, caused by constant confinement and continuous and sometimes severe mental strain, which overtaxes and hence weakens the intellect; on the contrary, a due percentage of shopwork not only furnishes recreation and physical exercise, but enables the student to appreciate much better the practical advantages of his theory.

It is urged by some of the advocates for separating the courses, that it is impossible to meet fully the requirements of practice in the schools.

While this is undoubtedly true, much more may be taught in a practical direction than is generally imagined, and I cannot subscribe to the statement on page 52 of the Report, to the effect that "the schools should confine themselves to teaching principles only. That moment they attempt to teach their applications they are either ten to twenty years behind the age, or else they incur the ridicule of practical men by teaching how to make something of no use." This may be true of some non-progressive institutions where the scientific periodicals never enter, and where no visits of inspection are made to workshops and structures in process of erection, but it can hardly be applied to any of our most prominent technical schools. All practical knowledge is progressive, and the sooner a student begins the better will be his chance of success. It is only by knowing what has been done and what has failed, with the reason why, that he can proceed rapidly to add to the general fund of invention or discovery. The greater the number of elements he possesses, the larger will be the number of possible practical combinations—and if the practical men will not furnish these elements, they must not expect from the schools such men as they desire to assist in developing their industries.

The statement is also made that "before eighteen or twenty years of age the body is not generally sufficiently developed to endure the physical hardships of engineering." My own experience was so totally at variance with this, that I hope I may be excused the egotism of remarking that I was but a boy fourteen years old, only four feet nine inches high, and hardly more than an animated shadow, from the effects of intermittent fever and too much study, when my father took me from school and gave me a level rod, almost as heavy as myself (at least so it seemed), and so tall that I could not reach the target at the top, to operate on the Troy and Boston and Troy and Greenfield R.Rs., in Massachusetts, during some severe fall and winter weather. Had I consulted my own comfort and convenience I should have preferred anything else, but I was obliged to weather it through whether I would or not, and it was, doubtless, the best school I ever attended.

A fellow member remarks on page 63, of a blast-furnace manager, "though he may have efficient subordinates in various departments, he must be able to understand and check their work, and he will find it extremely useful to be something of a mason, bricklayer, and carpenter, largely a surveyor, engineer, and mechanic, and well up in the general principles of chemistry and metallurgy." This I can heartily endorse, but I do not entirely approve the method proposed for acquiring such varied knowledge, for the report adds: "AFTER the school practice." Graduates, as a rule, are above mixing mortar, laying bricks, framing timbers, etc., but all this they can be made to do willingly if incorporated in their course, and their tutor is the right sort of a man, and will *show* them how.

But this introduces the difficult element of finding capable teachers. It requires that they shall be practical men as well as scholars, and it is one of the chief obstacles to the successful establishment and operation of technical schools. If a man is a successful practitioner, and has the requirements of a good teacher, there are no schools that can hold out sufficient inducements for him to close his business and consent to teach. Again, there are many who are *too practical* to teach, having, as they say, "grown rusty on their mathematics," and most of those now engaged in teaching have not had the experience required to do justice to so expanded a course of instruction. For the present, however, the difficulty may be met by calling in the service of some expert or foreman to explain the tools and their uses, and to direct students in their efforts to use them. A few weeks of such practice, with carefully prepared notes and sketches, would give them a fund of information they could never gather from books, and would do much towards breaking the ground for its further prosecution by the professors.

To accomplish this would require a small endowment, to be disposed of in a manner similar to the Whitworth scholarships in England.

Besides his practical knowledge, the engineer must be a man of integrity and good judgment, with experience in the management of men, and a financier. Most of these requirements can only be taught by combining theory and practice, organizing students into squads, gangs or parties, and appointing one of them foreman, who directs the workmen in their several duties. By comparing the cost of a piece of finished work with its estimate, they learn the value of labor and materials; and so, in many other ways, can the workshop be made to supply a great defect in the older methods of education.

With reference to æsthetics and art instruction, the greatest obstacle to progress arises from the apathy of the class intended to be benefited, the manufacturers, who, to protect themselves from competition, hesitate to furnish the information required to make such instruction practical. Hence it is that the remark is often heard that the designs of certain schools are pretty but impracticable. To overcome this defect to a certain extent, the Franklin Institute sent out the following circular to such of its members as would be most apt to respond favorably, but in return only a few drawings were received of a single firm:

* A paper read before the American Institute of Mining Engineers, at the New York meeting, February, 1877.

HALL OF THE FRANKLIN INSTITUTE, PHILADELPHIA, Sept., 1875.

DEAR SIR: In view of the great demand for a better class of designs in our American manufactured articles, it is proposed to give especial attention to this subject in the Franklin Institute Drawing School during its coming sessions.

In furtherance of this object, it has been decided to request from manufacturers of textile fabrics, paper hangings, porcelain, etc., the donation of such articles as will exhibit the necessary elements of design such, as structure, form, color, etc., with any suggestion they may be pleased to make as to any special requirement which must be fulfilled to make a design of *practical* value.

Donations are also requested from manufacturers of machinery of all kinds, of drawings or models that will serve as examples of mechanical drawing, representing modern practice in machine building. Any service that you may render the Institute, either by donation or information, will be properly acknowledged.

Respectfully yours, J. B. KNIGHT, Secretary.

Until we can have a better understanding and more perfect co-operation between manufacturers, engineers and teachers, we cannot expect to make much progress in our efforts to educate men who may practice successfully from the date of their graduation.

In conclusion, I have only to suggest that it would be a step in advance if such organized societies as this were to identify themselves with the educational institutions teaching kindred subjects, and by the appointment of a committee on Technical Education see that such information was placed within reach of those institutions as would assist them in keeping up with the progress of the age, and enable them to introduce, explain and exemplify the latest advance in methods and processes, by donating publications, pamphlets, drawings, photographs, models, ores or manufactured articles to such schools; prevailing upon manufacturers to open their doors for visits of inspection by students, and assisting the latter to secure positions after graduating, by keeping a register of their names and addresses.

The books thus donated would form part of a circulating library on scientific subjects, and be of much greater use than such works usually are when kept for reference merely. All growth is gradual, and all innovations are progressive. If this paper merely serves to increase the interest of practical men in the efforts made by instructors to raise the standard of the schools and increase their usefulness by enlarging their resources, it will have accomplished its purpose. The tree will be known by its fruit.

NOTE UPON THE COST OF BESSEMER STEEL RAILS.*

By P. Barnes, of New York City.

Several interesting and important considerations may be based upon an analysis of the cost of producing Bessemer rails, and the facts thus set forth may be much more clearly emphasized by reducing the items of cost each to its own fractional proportion of the sum total in each branch of the manufacture.

The estimate given below is not absolutely complete in minuteness of detail, but it may be fairly taken as a basis for the suggestions to be noted:

COST OF BESSEMER STEEL RAILS.

Item.	Class.	A. Converting.		B. Blooming.		C. Rail-Rolling.		Item.
1	Stock	Pig.	·629	Ingot.	·906	Bloom.	·827	1
2	Loss		·094		·036		·033	2
3	Spiegel		·092		.....		.....	3
4	Fuel		·037		·012		·011	4
5	Refractories		·018		.....		.....	5
6	Ingot Molds		·017		.....		.....	6
6	Repairs		·927		·013		·009	7
8	General Expenses		·015		·007		·017	8
9	Royalty		·018		.....		.....	9
10	Labor		·053		.026		·065	10
11	Crop Ends		.....		.....		·038	11
			1,000		1,000		1,000	

Perhaps the most striking comments that can be made upon this statement are those arising from a consideration of some of the smaller items, and even the least of these quite loses its insignificance when its proportion of the whole is expressed in actual money, as for the work of a year, or even for a single day.

Thus, if the item A 5 be considered, the importance can be clearly shown of the facts and suggestions noted in Prof. Eggleston's paper on "Refractory Materials," as recently presented to the Institute. Assuming a product of ingots of 250 tons in each 24 hours, and that their money cost may be put at $39 per ton, then the money total of A 5 becomes $176 per day. If, by a little closer watching or stinting, a saving of one-tenth of this amount can be made, there will be realized, on 300 days working, the handsome sum of $5,300.

If, again, item A 10 be considered, and it be assumed that, with returning prosperous times, an advance of 5 per cent. were to be conceded, then this, on the preceding supposition as to quantity, would amount to not less than $7,750 per year of 300 days.

If item B 4 be noted, it will be found that, if coal could be burned 5 per cent. more closely out of the ashes and clinkers, there would be realized a saving of $1,755 per year.

If item C 2 be noted, it may be determined that, if by more careful heating the furnace waste can be reduced by one-tenth of its actual amount, the net saving on a daily product of 200 tons will be for the year not less than $9,700, if the money cost of the rail be taken at $49 per ton.

One other general observation may be made in reference to item C 8. If such a thing could be imagined as that additional skilled supervision were to be employed, say to the amount of $5,000 per annum, then it may be determined that this addition to General Expenses would increase it by not more than 10 per cent. of its present proportion of the cost, the fraction due to C 8 being thus made .0187 instead of .0170. In other words, the addition of $5,000 of salary per annum, in such an estimate, would increase the total cost of production by less than two-tenths of one per cent. of its present amount.

If, again, in consequence of this proposed addition to the skilled supervision of the establishment, the saving already noted of 10 per cent. in item C 2 could be effected, and there could also be saved by this same means, say, 5 per cent. in item C 4, and 5 per cent. in item C 7, and 10 per cent. in item C 10 (and these are by no means unreasonable suppositions), it would be found that a net saving would accrue of a sum not less than $32,000 per year of 300 days.

These, in some respects, are striking figures, although they are no more than many of our manufacturers and engineers are making for themselves day by day, especially when re-arrangements or improvements in the details of manufacture are to be considered. Such comparisons are clearly to be commended for frequent use by those who desire to learn the precise results attained in daily practice, and to see in the clearest light the possibilities of improvement.

NEW YORK, February 26, 1877.

* A paper read before the American Institute of Mining Engineers, at the New York meeting, February, 1877.

DISCUSSION.

MR. METCALF said, in reference to the item of reheating, that where Siemens's furnaces are used a saving of about 10 per cent. to 15 per cent. of fuel can be made by using a solid cast-iron bottom—an immovable bottom—made up of Tupper bars, or any other equally good bars. The saving is threefold: first, there is no dropping out of large quantities of good incandescent coke when drawing the lower bars in cleaning. The lower step grate is removed and the clinkers are drawn out with a hook when necessary. Second, when the gas-maker pokes his fire and shakes it down, there is no such thing as the poker going clear through to the ash-pit, spreading the bars, letting out the fuel and making a passage into the gas space. Third, the coal is consumed more thoroughly and evenly, and the fire is in every way more manageable, with a good bed to work on.

ON THE UTILIZATION OF WATER POWERS BY MEANS OF DYNAMO-ELECTRIC MACHINES.

Dr. C. W. Siemens, in his recent address before the Iron and Steel Institute of Great Britain, made the following reference to this subject:

The amount of water passing over the Falls of Niagara has been estimated at 100 millions of tons per hour, and its perpendicular descent may be taken at 150 feet, without counting the rapids, which represent a further fall of 150 feet, making a total of 300 feet between lake and lake. But the force represented by the principal fall alone amounts to 16,800,000 horse-power, an amount which, if it had to be produced by steam, would necessitate an expenditure of not less than 266,000,000 tons of coal per annum, taking the consumption of coal at 4 lb per horse-power per hour. In other words, all the coal raised throughout the world would barely suffice to produce the amount of power that continually runs to waste at this one great fall. It would not be difficult, indeed, to realize a large proportion of the power so wasted, by means of turbines and water-wheels erected on the shores of the deep river below the falls, supplying them from canals cut along the edges. But it would be impossible to utilize the power on the spot, the district being devoid of mineral wealth, or other natural inducements for the establishment of factories. In order practically to render available the force of falling water at this and the thousands of other places under analogous conditions, we must devise a practicable means of carrying the power to a distance. Sir William Armstrong has taught us how to carry and utilize water power at a distance, if conveyed through high-pressure mains, and at Schaffhausen, in Switzerland, as well as at some other places on the Continent, it is conveyed by means of quick-working steel ropes passing over large pulleys. By these means power may be carried to a distance of one or two miles without difficulty. Time will probably reveal to us effectual means of carrying power to great distances, but I cannot refrain from alluding to one which is, in my opinion, worthy of consideration, namely, the electrical conductor. Suppose water power to be employed to give motion to a dynamo-electrical machine, a very powerful electrical current is the result. This may be carried to a great distance, through a large metallic conductor, and there be made to impart motion to electro-magnetic engines to ignite the carbon points to electric lamps, or to effect the separation of metals from their combinations. A copper rod of three inches in diameter would be capable of transmitting 1,000 horse-power a distance of, say, 30 miles, an amount sufficient to supply one-quarter of a million candle power, which would suffice to illuminate a moderately sized town.

The use of electrical power has sometimes been suggested as a substitute for steam power, but it should be borne in mind that, so long as the electric power depends upon a galvanic battery, it must be much more costly than steam power, inasmuch as the combustible consumed in the battery is zinc, a substance necessarily much more expensive than coal; but this question assumes a totally different aspect if, in the production of the electric current, a natural force is used which could not otherwise be rendered available.

MINERS' BENEFICIAL FUND.

TO THE MINERS AND LABORERS OF THE PHILADELPHIA AND READING COAL AND IRON COMPANY:

The Philadelphia and Reading Coal and Iron Company will give twenty thousand dollars ($20,000) as an endowment of a beneficial fund for insurance against accident and death of such of their miners and laborers as may desire to accept its benefits by complying with the following provisions:

1. Miners and inside laborers to pay to the fund thirty cents per month.
2. Outside laborers to pay twenty cents per month.
3. Boys and old men to pay either five or ten cents per month, as may be determined by the proper district superintendents.

All payments to be made monthly by deduction from the pay-roll, but no payments to be made in any month in which the person paying does not work; and, in cases where not more than one week's time is made in any month, the payments for said month to be reduced one-half.

In case of any accidental injury sustained by a contributor when actually engaged in the employment of the company, which incapacitates him from work, the party injured shall receive during the period of such incapacity the following sums:

Those who have paid thirty cents or twenty cents per month shall receive five dollars per week.

Those who have paid ten cents per month shall receive two dollars per week.

Those who have paid five cents per month shall receive one dollar per week.

Provided, That no payment shall be made for a longer period than six months, and that the certificate of a reputable physician that the disability is the result of an accidental injury, such as above described, shall be furnished at the end of each month.

In case of death directly resulting from any such accidental injury, the following sums will be paid: On account of those who have contributed thirty or twenty cents per month, thirty dollars in cash, and seven dollars per week for one year; for those who have contributed ten cents per month, the sum of thirty dollars in cash, and two dollars and eighty cents per week for one year; and for those who have contributed five cents per month, the sum of thirty dollars in cash, and one dollar and forty cents per week for one year.

The said payments of thirty dollars to be made within one month after the death, and the weekly allowances to be paid monthly during the year, and in all cases a certificate of the coroner or of a reputable physician will be required that death resulted directly from an accidental injury sustained as aforesaid, and not from disease. It being provided that in case of death the payments shall be

made exclusively to such relative, relatives, or heirs at law of the deceased as are first named in the following list: 1. To the widow. 2. To the children. 3. To the parents. 4. To the brothers and sisters. 5. To other heirs at law.

In no case shall the money be applicable to the debts of the deceased, or liable to be attached by his creditors, and in all cases the decision of the trustees, either as to the liability of the fund or as to the proper recipient of its bounty, shall be final and conclusive upon all parties.

Those of the employés of the company desiring to avail themselves of the benefits of the beneficial fund must signify their wish by signing a book to be provided for that purpose at the office of each colliery and iron ore mine of the company.

Each will be left free to contribute or not as he may desire, but in no event will any money be paid out of the fund to any other than a contributor.

The twenty thousand dollars endowment and all moneys received from contributors will be placed in the charge of Hon. Cyrus L. Pershing, President Judge of Schuylkill County, C. H. Tyson, President of the Safe Deposit Bank of Pottsville, and Franklin B. Gowen, President of the Philadelphia and Reading Coal and Iron Company, as trustees, who will make a public yearly statement of the receipts and expenditures, and any vacancy in the board of trustees will be filled by an appointment to be made by the president, for the time being, of the Philadelphia and Reading Coal and Iron Company.

All clerical expenses connected with the collection and payment of moneys on account of the fund will be borne by the company.

Franklin B. Gowen, President.

Philadelphia, March 17, 1877.

REPORT OF THE BRITISH PARLIAMENTARY COMMITTEE ON THE DEPRECIATION OF SILVER.

The committee of the British Parliament appointed to inquire into the causes of the depreciation of silver have presented a report, in which they sum up the more striking facts which have been brought before them, thus:

1. The total annual production of silver has risen to upwards of £14,000,000, from an average of about £8,000,000 to £9,000,000 in 1860.

2. Of this amount of £14,000,000 the mines of the United States are estimated to have produced about £7,000,000, with the prospect of an increase for some years to come. On the other hand, if the price of silver should remain as low as at present, there may be some diminution in the production elsewhere.

3. Germany has still to dispose of an amount which is certainly not less than £8,000,000, with the possibility that it may exceed £20,000,000, but with the possibility, on the other hand, that a considerably larger sum than the estimated amount may be ultimately required for subsidiary coinage.

4. The Scandinavian kingdoms have discontinued the use of silver, but the amounts of demonetized silver coin which they have thrown or can throw on the market are not important.

5. Austria has apparently been exchanging silver for gold, the amount of silver held in the Imperial Bank having diminished from £10,000,000 to £6,600,000 since 1871.

6. Italy has been gradually denuded of her silver currency. Since 1865 large amounts have been exported; her forced paper currency has apparently expelled the whole of the metallic currency, of which the silver coins amounted, at the beginning of 1866, to about £17,000,000.

7. France, on the other hand, has for some years past been replenishing her stock of silver, of which during the last four years her imports have exceeded her exports by £33,500,000.

8. England, Russia and Spain have each been buyers to the extent of some millions.

9. Japan and China and other countries in the East have absorbed a certain amount.

10. India still takes silver, but in greatly decreased amounts.

11. The Home Government has bills to sell to the extent of £15,000,000 per annum, which debtors to India can buy in the place of remitting bullion. This total has been gradually reached, and represents an excess of more than £10,000,000 compared with 20 years ago.

12. The gross remittances of silver to India during the last four years have been £15,000,000, compared with £28,900,000 in the four previous years.

Legislatively, the position is as follows:

Germany is gradually demonetizing silver, and looks forward to its use only for subsidiary coinage.

The United States is carrying out a policy of introducing subsidiary coinage in the place of all fractional paper currency now afloat, and of coining full-weighted silver coins, but only on a contracted scale, and only available for legal tender for a limited amount.

The members of the Latin Union and Holland have adopted an expectant attitude, but meanwhile limit, as far as possible, the coinage of silver.

No indications are given of any intention on the part of Russia and Austria to pass any laws with regard to their currency.

The actual facts which have been enumerated speak for themselves, and it will be seen at once which of them are in favor of a rise in the price of silver and which of them tend in a contrary direction. It is important, too, that the temporary character of some of these facts, and the normal character of others, should be fully taken into account. The surplus stock of Germany will, in all probability weigh heavily on the market for some time to come; still, it is a temporary circumstance. On the other hand, the United States will afford temporary relief to the market by retaining for her own coinage considerable amounts of the silver there produced. It is, indeed, possible, according to the evidence adduced, that the United States will retain as much silver for her new coinage operations as Germany may have to sell as the result of hers.

The case of France deserves especial attention. The replenishment of her stock of silver can scarcely be regarded as other than a temporary circumstance. During the last four years, out of a total of £76,000,000 of disposable silver, France absorbed £33,500,000. The relief thereby given to the market must have been immense. It is impossible to assume that it can be continued on the same scale. The natural inference to be drawn would be in the opposite direction.

With regard to India and the East, hitherto the largest consumers of silver, so much must depend upon the prosperity of the populations, on the abundance of the crops—in fact, on their powers of production—that it is impossible to make any forecast, and, as regards actual facts, no more can be stated than that, on the one hand, they have always possessed a very large power of absorbing bullion, while, on the other, that power has been diminished by the growth of the sums annually payable by India to the Home Government.

The only facts in any calculation as to the future which are certain, and appear to be permanent, are the increased total production of silver and the effect caused by the necessity of the Indian Government to draw annually for a heavy amount. Both are adverse to the future value of silver, as far as they go, but they may be partially counterbalanced by changes in the trade with the East.

As regards Europe, much must depend upon the action taken by the Governments of the various countries where the question of the currency to be adopted is still unsettled. Your committee have not considered it to be within the scope of the questions referred to them to make inquiry as to the intentions of these Governments, though many references to their views will be found in the various official documents procured for the committee by the Foreign Office. Your committee, on this point, would simply remark that it is obvious that, if effect should be given to the policy of substituting gold for silver wherever it is feasible, and giving gold (for the sake of its advantages in international commerce) the preference even among populations whose habits and customs are in favor of silver, and thus displacing silver from the position (which it has always occupied) of doing the work of the currency over at least as large an area as gold, no possible limits could be assigned to the further fall in its value which would inevitably take place; but your committee are bound to refrain from giving any opinion on the expediency of such a policy or the necessity for its adoption.

LECTURES ON MINING.—No. XXXVI.

By Prof. W. W. Smyth, M. A., F. R. S., Royal School of Mines, London.

In the present lecture the lecturer wished to draw attention to some apparently minute details, which would, however, exercise a serious influence on the workings afterwards. In taking the subject of working away stratified deposits we approach a subject which is of the largest practical importance, both in this and other countries, and the details of the workings vary so much in different parts that, in order to judge fairly and fully what may be the most economical and secure method of working away the deposit, it is necessary to make a careful study of different methods, either in person or through the medium of suitable reports and descriptions. The importance of selecting the best methods of working away the deposit begins to show itself very soon after a commencement has been made. A plan ought to be laid out beforehand by means of which, supposing all the circumstances remain satisfactory, certain definite arrangements shall be carried out, both as regards the getting of the mineral, its removal, and the system of ventilation to be adopted by which the workings are to be rendered safe and suitable for the men to be engaged. Otherwise the result will be that not only will considerable portions be subject to be entirely lost and wasted, but it will also exhibit itself in a variety of ways, which will tend to render the work expensive, and deleterious to those portions which we may get away. Among these are two or three circumstances which may be noticed. The effect of taking away the coal or other mineral too near the bottom of the pits has been shown by a case in Belgium, where a small settlement produced the most fatal results. Any tendency of the ground about the pit to settle should be fully guarded against by leaving massive pillars 60 x 60 yards, or 60 x 80 yards, several of them together. The first consideration on getting down to the bottom is that there shall be nothing to jeopardise the safety of the workmen, which getting the coal too near to the pit bottom would do. From the pit to the primary workings will be chiefly taken up by the main roads, so that any crush in that part will hamper the whole of the workings. Without this sort of precaution (and the great bulk of these considerations has special reference to coal) entire plants may be subjected to whole or partial destruction by the processes called "thrust" and "creep." This may be met with in other districts besides those of coal—in the ironstone districts of Yorkshire. The usual way of working the ground is to take away a certain breadth of mineral, and then leave another breadth standing as a pillar, and so on alternately. The first outset will be to drive a drift, such that it will hold itself by its natural roof, and then to see that the distance left between that drift and the next is sufficient to hold the roof. When a certain quantity of ground has been taken away the pressure overhead will begin to manifest itself. If the roof be very soft it will be shown very probably by some of it breaking away. If the roof be strong, and the floor strong, you have the pressure exhibiting which is called thrust, flakes will break away from the roof, and then from the pillars, and tend to fill up the intermediate spaces. A still more insiduous kind of destruction is that where you do not see the roof break away, and where the pillars stand pretty firm, but where the floor is affected. And this is especially the case where, as in the great proportion of the coal districts, the floor is composed of a soft or more or less indurated clay, being in reality the bed soil in which the plants grew which have gone to form the coal. The floor in such cases will tend to rise, and if you have laid down rails you will have to put roadmen in to level them. This is only the first aspect of the thing; it will go on, the pillars will be thrust out of shape, then the beds below will be thrust up, the pillars will crack, and the end will be the entire excavation will be filled up, so that if you wanted to drive through it you would have to drive through a mass of broken coal and other material. A district is said to creep, or be crept, when it is in this condition, and sometimes hundreds of acres together will be thus affected.

This lecture will have to embrace in great measure those cases in which the whole or the greater part of the material has to be extracted, such as coal, salt, building stone, etc., where the whole is taken out, except what must be left for the security of the ground. It is true that no coal is so pure that some of it has not to be left behind, and also the mere getting of the mineral produces some which has to remain; hence there must be a careful investigation made as to what method of working will give you the greatest quantity of round coal in proportion to the small. In this connection we have to recollect that in certain districts small coal is of no value whatever, and this used to be the case over the greater part of our districts. In the districts of central England and in Wales, for instance, millions of tons of small coal are stored away underground. In other districts it is well suited for coking. But a very great change has been made in this point of late years; large quantities of small coal has been used for engines, etc., and many plans have been proposed for making it into patent fuel, or agglomerated coal. All these improvements one cannot hail but with joy, for it seems an act of wanton wickedness to waste such a large portion of our national store. While the round coal may fetch 7/ 6d. to 10/ per ton, the small will, perhaps, be worth only 2/ to 5/; the difference, therefore, is so considerable that it is necessary to look most carefully at the different systems of working, by which the proportion of small produced in the getting will vary from as much as one-third or one-quarter in some cases, to as much as one-half in others. The seams in some cases, as at Whitehaven, may have a thickness of 10 feet without any parting, but it is very rare to get more than six feet or so. Sometimes there are several seams, each of them best suited for some particular purpose. The partings, too, may be so like coal that it will require a very strong light for the collier to be able to distinguish between them. Besides, the general circumstances of the locality will have to be taken into account, as in mineral veins,

before we can select the most suitable mode of working, the thickness, depth, nature of the rocks above and below, strength of the mineral itself. There are special considerations in the case of coal and ironstone, where large quantities have to be extracted, such as the regularity and amount of sales to be expected, whether the sales take place on the spot—land sales—or not, and also the presence of faults. The presence of these faults, in greater or smaller number, and the depth of the mineral from the surface, may so affect the working that while in the shallow deposits of Staffordshire and Shropshire you find pits in almost every field, in the deeper lying seams of the North you may pass over a couple of miles without meeting with a shaft. Many of the smaller collieries are, in fact, bounded by faults. A considerable upthrow will tend to keep out water, and it will, therefore, be advisable to work each such district by itself, where the seams do not lie so deep that the expense due to sinking so many pits does not counterbalance the advantages gained.

It is often the case that some small attempts have been made to get square or round portions of the mineral, leaving each space with a little wall round it; this may be seen in the brown coal district of Nassau and other parts, in working the ironstone in Derbyshire and Yorkshire, and again in some of the districts of rock salt in the East of Europe. If we take the case of Yorkshire or Derbyshire, the system of bell pits is frequently used for getting the ironstones. Shafts are sunk through a moderate thickness of overlying measures, where perhaps a great extent has been taken away to open-cast before. Several of the shafts are put down together, at a tolerable distance asunder, and as soon as the mineral is reached the ironstone is dug out from the shale, the bottom of the pit is enlarged, till the excavation takes on the form of a bell. There should be two or three feet thickness of wall left for security between successive bells; sometimes the wall is holed through in places, and there is plenty of rough material left for the men to stand on to do their work. As the pits get lower and lower down the seam they are met with increased difficulty from the drainage and depth; the shafts can be left temporarily open, with perhaps a few boards over the mouth. This explains why you sometimes find in these districts a field full of windlasses, for it is important to remove the mineral as rapidly as possible, before the pressure of the ground begins to take effect, or the ground is affected by oxidation. More notable are the bell pits sunk to extract the rock salt in Transylvania, and principally those of the works at Maros Ujvar, where you have to sink through a cover principally of clay. On reaching the bed the pit is enlarged, the men standing on boards resting on a kind of bracket, forming a kind of level; this is continued till a vast vault is formed, 130 to 140 feet diameter, one of the most remarkable sights to be seen underground in the world. In plan these pits are rectangular.

All formations are subject to be traversed by planes of division, variously termed backs, joints, master joints, according to their importance. Such divisions occur in coal very close together, and are called by the colliers cleat, or cleavage, the term faces being sometimes used. In Derbyshire and Leicestershire the cleavage, or cleat, is principally in one direction, and coals from those districts have a tendency to break into long pieces. In other cases you will find that there is also transverse cleat, which sometimes is at right angles to the first, and then divides the coal into cubical blocks, in other cases it is oblique, and then produces rhombohedral coal. This cleat extends with great parallelism over large areas, and its direction governs that of the principal workings, for if the workings are carried on the face of the coal—that is, in a direction at right angles to the main direction of the cleat—the coal will come away with much greater freedom than when working in the opposite direction—on the ends.

As a general rule the usual process with regard to these stratified deposits is to select the deepest place we can get to in the area in which we have the right to work, then to take a tolerably central position in that, and there sink a shaft and drive out levels. If we can get access to the seams from a valley a level will not probably be driven, but if we can only get access to it by means of a pit we shall endeavor to put this down in a central position. And here will come in a very important question, as to whether it will be advisable to put down the plant at this shaft for the working of the ground, whether we should have two pits near together, or—what is an excellent plan as regards ventilation—to have an extra pit to the rise of the coal. Many circumstances in the dimensions, etc., of the piece of ground may make one or other of these plans desirable. From the shaft bottom, according to the amount of inclination, a pair of levels will be driven out, with a few yards of coal between them, partly for facility in after working, partly for the purpose of exploring the seam. Then we must take care to leave a sufficiency of unwrought coal around the bottom of the shaft. Where the colliery is of considerable means it may be desirable to drive out three of these parallel levels, the lowest being principally for drainage, one of the others for return air, and the third for haulage. These levels will be put in connection at intervals, for the purpose of ventilation during the driving. Whatever system of working be adopted, it may be convenient to have these levels, but inasmuch as they are narrow workings, and therefore expensive, it becomes a question sometimes whether they cannot be done away with. In one system—long wall—we can do without them, the men work along a face 20 by 50 yards long, the roof falls down behind them in the worked part, and the roadways pass through this worked ground are kept open by packing up the material on each side; these are called "gob-roads." But in the system where a portion only of the ground is removed, and pillars left, it is necessary to have these principal levels.

Among the interruptions with which we are likely to be met in driving these levels are faults. Thus, in Fig. 31 the level shown in plan is met by the fault, F, dipping in the direction of the arrow. Evidently the coal at B will be lower than at A, and in order, therefore, to keep the level horizontal it will have to be turned gradually in the direction shown, and will cut the seam again (say) at C, the seam dipping in the direction of the arrow. If the levels are intended for working on a large scale it may be necessary to pay no attention to small faults of this kind, but to carry the level straight on as a stone drift, so that it should not be impeded by these deviations.

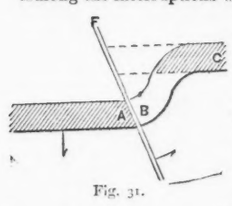


Fig. 31.

After this we shall have to come to the important question how the coal itself is to be got, whether on the system usual in the North of England, Lancashire, and some parts of the Scottish coal field—that of opening up only narrow workings between large pillars, and then, perhaps, removing the pillars themselves; or on the system usual in central England, South Wales, and the brown coal fields—that of removing the entire body of coal, leaving none whatever.—*From the London Mining Journal.*

Duncan Silver Mine, North Shore, L. S.—On the fourth level has been found some ore of a mixed character, containing sulphuret of silver, associated with zinc blende, iron pyrites, etc. This is considered encouraging.

MINING NEWS.

Staff Correspondence of the Engineering and Mining Journal.

COLORADO.

Placer operators in Platte, Arkansas and Blue Valleys are already making preparations to begin work for the season. The Fairplay mine will soon receive a large force of operators; Mills & Hodges, at Alma, are overhauling their flumes and piping; the Oro Dutch Co. in California gulch will be in full work, we are informed, in thirty days; Mr. Havens, of the Fuller mine in Georgia gulch, is on the ground already, and new machinery for the Izzard bar, on the Blue, is being set up. Some snow yet remains in the higher gulches, but not enough to impede work any longer.

There is a new strike of some importance reported from Quartzville. A new ore body of rich material has just been opened at the Dolly Varden. Its size is yet undetermined.

The Pocahontas is shipping about five tons daily, taken mainly from the upper levels. As soon as the hoisting works are completed, a large force is to be put on and the development of the mine will be resumed.

Five hundred stamps are running at Central City. The Black-Hawk, Briggs, Buell & Smith, and Parmelee are the heaviest producers.

What is called the "ore ranch" at Ouray, is, perhaps, the largest deposit of mineral yet found in the West. Acres and acres of ground have been staked off in claims, over the whole of which ore is found in apparently unlimited quantity. The formation, so far as the surrounding and inclosing rocks are concerned, is sedimentary. The thickness of the mineral deposit (which carries a large percentage of argentiferous lead) has not yet been determined, nor has any satisfactory test of the ore yet been made, that we are aware of, which determines its exact value.

The production of gold from the Summit district, south-west of Del Norte, will probably reach $75,000 at least this year. The South Mountain mines are reported to be, as a body, capable of yielding more ore already than the stamps in the camp can crush. It is understood that the defects in the mills which last year caused the production of so much base bullion have been remedied. Meanwhile a new gold district, between the Summit and Del Norte, has lately been struck which gives much promise.

IDAHO.

As the water is lowered in the "Golden Chariot" mine, the prospects shown are very encouraging. The new stopes are yielding well, and ore is accumulating on the dumps awaiting the repairing of the mill. On the 1,300-foot level the ledge shows improvement as the breast approaches what is known as the Linkton chute, a zone of ore which in the upper workings yielded very finely, and which is thought to extend into and below this level.

The Belle Peck is yielding well and shows a fine stope in its 1,000-foot level. The main shaft has been completed for the present, and drifts are being run either way on the lode. The deep tunnel running for the mine is advancing at a fair rate.

The general condition of the Owyhee mines is much better than at the same time last year. It is thought that most of the large companies will resume work this season, as the developments made on the smaller mines in about every case show good results.

MONTANA.

Horse-power hoisting works are being erected at the shaft of the Walker Bros. mine at Butte, which has now attained a depth of over 100 feet. Good ore in fair quantities has been found, and the owners now consider their investment a good one beyond a doubt. This firm are among the most energetic miners in the West, are not easily frightened at expense, and when they receive encouragement in development will not stop till the prospect becomes a property of value. Their work at Butte will have, and is already exercising, a very strong influence with others.

On the old Whitlach Union mine at Unionville, the Company are making preparations to follow the vein from the bottom of the eastern incline westward. This mine since its discovery has yielded about $3,000,000 in gold, and is regarded as one of the best claims in the Territory. About a year and a half ago the workings in the western part of the mine ran off the vein, since which time the bullion yield has been unequal to the expense of mining. It is thought that the explorations now in progress will put the mine in pay again before the summer closes.

The production of argentiferous copper ore from the Butte mines is increasing monthly. Last year that district shipped over 700 tons of ore, carrying nearly 40 per cent. of copper and over 20 ounces of silver per ton. This without any concentration beyond hand sorting. The yield for the present year is expected to be over 1,000 tons. The camp is not yet three years old.

The six silver mills now running in Montana are shipping at present about $4,000 in silver bullion daily. The most of this comes from Butte and Phillipsburg.

Special Correspondence of the Engineering and Mining Journal.

Of the mines in the New York Board the Hukill is the best, and perhaps has not a superior in Colorado. This, when ore in reserve and absence of capital or "pinching" of vein since first opened are taken into consideration, together with uniformly profitable character of ore.

The Pleasant View reopened last year, and is said to have paid something (with a big vein), but has been idle for some months.

Some work, I think, is being done on the Consolidated Roe and Hercules above Georgetown, but with no great results that I have heard of for many months or a year.

The Luzerne Company is a small concern in Russell Gulch, Gilpin County.

The Seaton paid extremely well in portions in 1870-71, and has yielded much very rich ore, but has been idle a great deal. F.

April 1, 1877.

The Sugar Loaf Mines, which we noted in our last as being partially flooded, have put in an additional pump, with a capacity of 1,000 galls. per minute. It is expected that the water will be pumped out, and the mines will be producing from 500 to 1,000 tons per day before the end of the month.

Springhill and Parrsboro (Nova Scotia) Coal R. R.—This road is now nearly completed, the track being all laid, from the coal mines at Springhill, southwest to Parrsboro, Nova Scotia, 27 miles. The terminus of the road is a mile south of Parrsboro town, on Whitehall Creek, just above its mouth, on the Bay of Minas, and at this point a large wharf is being built. The traffic will be chiefly in coal. The road is equipped with one engine, one passenger, one baggage, 20 freight and 100 coal cars.

MINERAL PRODUCTION OF COLORADO—REPORT FOR 1876.

Special Correspondence of Engineering and Mining Journal.

(*Continued from page* 224.)

CLEAR CREEK COUNTY, CENTRAL COLORADO, April 1, 1877.

The yield of Clear Creek County for 1876 was as follows, coin value:

Silver	$1,837,387 31	Lead	$50,000 00
Gold	95,161 00		
			$1,982,548 31

Of these amounts $473,414 was exported in the form of silver bullion, $1,313,973.31 in ore, $40,000 mainly in stamp mill gold retort from Gilpin County mills, and $45,161 in bar and placer gold. The following table shows a more detailed statement of the bullion, quantity and value of ore mined, milled or exported.

YIELD OF THE MINES OF CLEAR CREEK COUNTY FOR 1876.

	Ore	Ore	Silver.	Coin value.
SILVER BULLION	Tons.	lb.	oz.	
From Judd & Crosby, Pelican, Clear Creek and Stewart Mills	3,500		401,198·9	$473,414 00
SILVER ORE SHIPPED.				
Church Brothers & Co.	2,073	775	381,573·8	450,257 03
G. W. Hull & Co	1,218	....	294,813	347,879 34
Matthews & Co.	671	167	113,333·8	133,733 88
L. F. Olmsted	634	310	88,781·7	121,948 63
W. Bement	451	463	60,276	.....
Silver ores from Idaho, etc.	250	....	21,190	25,000 00
Other silver and lead ores, etc	1,278	....	87,875	145,629 09
CONCENTRATED ORES.				
Clear Creek Company—ore dressed exclusive of that treated in mill	4,000	....	108,150·9	127,618 04
GOLD.				
Gold from lode veins	2,000	....	....	40,000 00
Gold, placer and bar	....	....	....	45,161 00
	16,075	1,715	1,557,193·1	$1,982,548 31

About 11,000 tons of ore were concentrated altogether. Deducting 2,500 tons of concentrated ore, credited above to mills and ore buyers, the amount of ore mined in the county will appear as follows :

	Tons.
High grade ores	9,575
Crude ores before concentration	11,000
Total handled	20,575

No ore was sent to Europe. The yield of that sent to Black Hawk was $534,400. Shipments were also made to Denver and Golden. Some 1,676 tons were divided between St. Louis, Mo., Pittsburg, Pa., and Wyandotte, Mich.

The capacity of the four reducing mills of Georgetown is from 30 to 45 tons daily, according to character of ore. The great competition between ore buyers gives the miners very high prices at Georgetown. This competition at and since the close of the year is said to be such that there is no profit in purchasing.

The Judd & Crosby Mill turned out the most bullion, and was running, with the exception of two stoppages for repairs, during the entire year. It is now idle and undergoing repairs. The Pelican Mill, of still larger capacity, was at work steadily on the third class and concentrated ores from the Pelican Mine. After being overhauled and rebuilt internally it resumed work in February, 1877. It contains five Bruckner cylinders, ten stamps, and eight amalgamating barrels.

The Clear Creek Company, F. M. Taylor, superintendent, completed its concentrating mill in January, and its roasting and leaching mill in September, 1876. The former handles from 20 to 48 tons daily, by the dry (Krom) process according to time run—12 or 24 hours. This connects with the reducing mill. The latter contains ten stamps, four Bruckner cylinders and a series of leaching tubs. These works are situated near the center of Georgetown and just above the Pelican Mill.

Concentration has been of great benefit to this district. Late in 1875 the Silver Plume Works began operations, and have kept at work ever since ; they dress from 20 to 25 tons of ore daily, when running 12 hours. The Rocky Mountain Mill was completed by Matthews & Co. about October 1, 1876, since when they have been dressing 20 tons daily. The Silver Queen Mill, completed last year, ran but a short time, and has since been shut down. The Lebanon Tunnel Mill (five tons) and the Terrible Dressing Works will probably be at work next summer. All of these have the "wet" process.

Some important operations have been inaugurated since the beginning of the year. The most extensive of these is the consolidation of the Terrible and the rich lodes of Hamill and Senator Chaffee, taking in a large part of one side of Brown Mountain. Of some forty veins the most famous are the Brown and Coin, once very productive, the Silver Ore, the true vein from which the rich Terrible ore came, and the Mammoth, Old Missouri, Glasgow and Gunboat. For this Messrs. Chaffee and Hamill receive the new issue of nearly $1,000,000 stock of the Terrible Lode Mining Company. The total amount of this company's stock is now nearly $1,500,000. The property embraces a greater number of first-class mines and a larger value than that of any other individual or corporation in Colorado. Tunnels are being driven, shafts sunk, and the dressing works will resume operations, and possibly the old Brown reducing mill may be remodeled and set in motion. It is expected that several hundred men will be employed. The Terrible has produced as high as $200,000 per annum, and the Brown $150,000.

More "rich strikes" are reported in various localities around Georgetown than have been heard of for years. Six miles below, or northeast of Georgetown, some recent discoveries on Red Elephant Mountain have attracted some 200 miners. The Free America, the best of these, has few equals, and turns out many tons of rich silver ore daily.

The richest "strike" recently reported is the S. J. Tilden, on Leavenworth Mountain, found in December. The discoverers paid the Marshall Tunnel Company a royalty of about $10,000 in three months.

The Pelican and Dives have led all other mines in production. The Stevens, Chelsea Beach, Baxter, Payrock, Polar Star, Magnet, Colorado Central, Marshall Tunnel lodes, and the Hukill have yielded largely, and nearly all of them have paid handsomely.

A lead vein in the Burleigh Tunnel pays all expenses of driving. This tunnel is now over 2,100 feet long. The Diamond Tunnel, 1,250 feet long, has reached the line of the Dives. Seven different parties are leasing or paying tribute on the veins already intersected. A side drift leads off into the Baxter, now one of the best paying mines of the county. The Lebanon Tunnel, 820 feet long, has opened some of the best veins in Republican Mountain.

Near the line of Gilpin County, at the head of Virginia cañon, is a new discovery called the Clarissa. From its similarity to the famous Hukill in value and character of ore, it is considered one of the best discoveries made in years. It has a four-foot vein carrying gold, silver and copper. Its ore sells at from $10 to $600 per ton, varying as assorted. F.

ON THE SPECIFIC GRAVITY OF CERTAIN LEADS.*

By Charles P. Williams, Ph. D.

The determinations of the specific gravities of a number of samples of lead produced in Missouri, and which form the subject of this note, were undertaken with the view of ascertaining if any approximation to the purity of such leads could be reached in this manner. The results would seem to indicate that, whatever value the method may have in the case of the crude and more impure leads, for any of the refined or the soft leads which would meet the requirements of the manufacturer of white lead the indications would be certainly fallacious and unreliable if not entirely worthless.

In a problem of the kind indicated, there are many disturbing factors. Not the least important of these is the admitted lessening of the density of the metal by hammering or rolling (Morveau†), probably on account of slight cracks resulting from such treatment‡—a fact which, at the very outset of the work, introduces an element of uncertainty into the sampling of the metal. A second cause of error is found in the fact that, while in general the smaller the amount of impurities the higher the specific gravity of the lead, there are exceptions, "probably in consequence of differences in crystalline conditions." § According to Schweitzer, ‖ "lead in its purest state shows indications of crystallization, readily observable on the surface, which has the appearance of fern leaves or frost ; minute quantities of impurities, to my knowledge copper and antimony, prevent the appearance of these figures and render the metal denser, and have probably been the cause of the high specific gravities given by Berzelius and others."

In the third place, the method of operation has a marked influence. Streng** describes the change of specific gravity accordingly as a platinum wire or a hair is used for suspending the lead ; the first giving in one case 11·378, and the second 11·394 ; and, for a second case, 11·372 and 11·390, respectively. My own experience has been that the method with the flask invariably gave lower results than that with the hydrostatic balance, suspending the sample by a fine hair. As the specimens used in the flask determinations had been cut by the chisel into many smaller pieces, these results may be due to greater changes in the structure of the leads. It was found, also, that samples which had been reduced by the rasp, gave still lower results than those cut by the chisel, both being determined in the flask.

With such liability to variations, arising from mechanical causes, from chemical composition, and from manipulation as well as from other sources, the wide range of specific gravities given for "pure" lead is explained. Among the more recent determinations, I find the following :

Specific gravity of "extraordinarily pure lead" (prepared by Dick, determined by Tookey), chiseled out from the pig 11·382 at 15·5° C. (Percy's *Metallurgy of Lead*, p. 3), reduced to 4° C. = 11·383. Matthiessen (*Jahresbericht*, 1860), 11·376 at 14° C. = 11·378 at 4° C. Reich (*Berg-und Hütten. Zeit.* 1860, p. 112), 11·370 at 4° C.

Schweitzer (*loc. cit.*) lead, carefully prepared from sulphate, gave by three determinations, each reduced to 4°C., 11·345, 11·358, and 11·356, respectively, or a mean of 11·353.

For the annexed results the specimens were chiseled from parts of the ordinary pigs, and the determinations made with the specific gravity flask, using amounts of about twenty grammes, and with all precautions to insure accuracy. The percentages of lead given were obtained by difference after estimating the foreign matters in one hundred grammes. The specific gravities at the observed temperatures were reduced to 4° C. by the following formula :

$$G' = \frac{G \times g^{v}}{1 + \cdot 000089\ (4^{\circ} - t^{\circ})},$$

in which G′ is the required specific gravity at 4° ; G, the observed specific gravity at t° ; g^{v}, the specific gravity of water at t°, referred to water at 4°, as given in Kopp's table ; ·000089, the cubical expansion of lead for one degree, also according to Kopp. The specimens represent as many different brands ; the numbers refer simply to the laboratory record :

No.	Per cent. Pb.	Sp. Gr.	Sp. Gr. at 4°C.
I.	99·99247	11·359 at 21°C.	=11·354
II.	99·97469	11·340 " 18°	=11·339
III.	99·98320	11·341 " 18°	=11·340
IV.	99·96359	11·347 " 12°	=11·350
V.	99·97774	11·368 " 17°	=11·368
VI.	99·97786	11·342 " 18°	=11·341
VII.	99·98078	11·356 " 18°	=11·355
IX.	99·92124	11·356 " 12°	=11·359
X.	99·96996	11·372 " 18°C.	=11·371
XI.	99·97191	11·351 " 17°	=11·351
XII.	99·97509	11·373 " 17°	=11·373
XIII.	99·91919	11·314 " 11°	=11·318
XIV.	99·94548	11·337 " 11°	=11·344
XVI.	99·89337	11·329 " 18°	=11·328
XVII.	99·74526	11·344 " 10°	=11·346

The mean of the above fifteen samples is 11·349 at 4° C., and the mean percentage of lead is 99·94138.

As a check on these results, equal weights of the leads were melted together in a graphite-coated Hessian crucible under potassium cyanide; the cast button, weighing about 200 grams, was carefully cleaned, and two determinations made of the specific gravity at 15·5° C., using about twenty grams chiseled from the button for each trial.

1st trial gave specific gravity	11·341
2d " " " "	11·347
Mean	11·344

Or, 11·346 at 4° C.

The mean percentages of foreign matters in the fifteen samples may be taken as follows :

As	0·00562 per cent.	Fe	0·00511 per cent.
Sb	0·01359 "	Zn	0·00231 "
Ag	0·00252 "	Ni	0·00191 "
Cu	0·02756 "		0·05862

* A paper read before the American Institute of Mining Engineers, at the New York meeting, February, 1877.

† Gmelin's *Handbook*, vol. v. p. 106.

‡ Kerl, vol. i. p. 694.

§ *Ib.* vol. i. p. 693.

‖ *On the Specific Gravity of Pure Lead*, read at Buffalo meeting of American Association, *American Chemist*, November, 1876, p. 174.

¶ Specific gravity of lead "when in the utmost attainable state of purity," 11·445, according to Berzelius (Gmelin's *Handbook*, vol. v. p. 106).

** Kerl's *Handbuch*, vol. i. p. 694.

Allowing nothing for contraction, the calculated specific gravity of a mixture of the above metals, in the proportions given, would be 7·6934, referred to water at its maximum density. Employing this factor and the mean of the observed specific gravities of the samples, and ignoring the contraction which would be of small value, the calculated specific gravity of the theoretically pure lead would be 11·352, a result not differing materially from Schweitzer's mean of actual determinations.

A glance at the table will show that this value will not give even rough approximations to the percentages of metallic lead, and, for leads of the character used in the experiments, the method of specific gravity appears to be valueless as a test of purity.

ROLLA, Mo., February 20, 1877.

NOTES.

DR. EAMES'S glass furnace was recently put in operation at the glass factory of Thomas Wightman & Co., Pittsburg. This furnace uses naphtha for fuel and is a success.

EXPLOSION OF FIRE DAMP IN PENNSYLVANIA.—An explosion of sulphur occurred in the Middle Creek mines, near Tremont, on the 10th inst. Seven men were burned, but, although their injuries are severe, it is thought they will all recover.

COLORADO COKE.—An exchange says: "Arrangements have been made to send coke from Trinidad to Salt Lake, for smelting purposes, at $12 a ton, which will be against $25 a ton for coke from Pittsburg.

GOING WEST.—Twenty-five persons, principally of the mining classes, left Scranton, Pa., April 3d, for the West, hoping to better their condition. A party of fifty or more is organizing in Shenandoah to go to the Black Hills. They will leave on the 10th of April, by the Northern Pacific route to Bismarck. The fare is $35 50 in first class coaches, including baggage checked through.

NEWS ITEM.—Under the heading of "A Hopeful Outlook," the *Scranton Republican* of the 11th inst., says: "The Delaware and Hudson Canal Company, and the Delaware, Lackawanna and Western Railroad Company, have taken bankrupt roads and made them pay, and are entitled to the gratitude of the community therefor." We are glad, indeed, to hear such unexpected good news, but we would like to know whether our esteemed contemporary is not using *blue glass* in its spectacles or inkstand, or somewhere about, for in that case a certain discount would have to be allowed on its hopes.

AGENTS' DUTIES IN BUYING FOR ASSOCIATES.—It appears that Gen. Sam. F. Cary, late the greenback candidate for Vice-President, had taken advantage of the confidence reposed in him by a number of individuals who made heavy investments in a Colorado mine, represented by him to be a big bonanza. The matter came into court, and the court found that Gen. Cary had agreed with his associates and partners in the enterprise to buy the mine for their common benefit for $50,000, took the money to buy it as their agent, bought it for $22,000, and divided the balance between himself and his nephew. This balance of $28,000 the court deemed must be accounted for by Cary to the subscribers to the stock.

NEPTUNIUM, A NEW METAL.—Prof. Hermann announces in the last issue of the *Journal fur praktische Chemie* the discovery of a new metal to which he gives the name Neptunium. The new metal was discovered in a mineral of the columbite group, in the course of an investigation on the oxides of niobium, tantalium and ilmenium. The existence of the new element was determined by fusion with microcosmic salt, which gave a colored bead not before observed of the oxides of this group. The author found that the double fluorides of this metal possess the general characteristics of the above metals, *i. e.*, solubility in water and isomorphous crystallization. The author is prosecuting his investigations, and hopes to be able to isolate the salts of the new metal and the metal itself. It is interesting to remark in conclusion that this investigation was undertaken with the view of establishing the correctness of the author's previously announced discovery of ilmenium, a discovery which was called into question by Profs. Rose and Marignac. Hermann, in this interesting publication, not only reaffirms the genuineness of his former discovery, but points out that his critics were in error, having been misled by using impure material. The investigations of Hermann would, therefore, appear to place beyond question the existence of ilmenium, and to render probable the existence of another metal (neptunium) entirely new to science. —*Polytechnic Review.*

PREVENTING CORROSION OF IRON.—Prof. Barff recently delivered a lecture on a treatment of iron for the prevention of corrosion, which promises to greatly extend the usefulness of the most useful of all metals. The temperature of the articles to be protected is raised to about 500° Fahrenheit in a suitable chamber or muffler, to which steam is admitted. The articles having thus been exposed at a high temperature in an atmosphere of superheated steam, the black or magnetic oxide is formed on the surface. This oxide is credited with the quality of putting a stop to further oxidation, whereas the ordinary form of oxidation or "rusting" grows on what it feeds, serving as a carrier for atmospheric oxygen to the iron to almost any depth. The black or magnetic oxide produced as above described forms a coherent and adherent coating which is not subject to change in the presence of moisture and atmospheric oxygen, and which is not decomposed in any temperature to which iron is exposed in its ordinary uses. Hence this treatment may be used for the protection of iron used for street mains, for iron instead of lead service pipes, for household ut ensils of all kinds as a substitute for tinning, and for all kinds of architectural ornaments. Professor Barff makes no estimate of the cost of such treatment, but it is claimed to be less than the cost of galvanizing or tinning kitchen articles. The oxidized surface is said to be much harder than the surface of iron not thus treated, so that the durability of the articles would be as great or greater than that of similar untreated articles.—*Phila. Ledger, April 6.*

LABOR AND WAGES IN THE PENNSYLVANIA AND ILLINOIS COAL REGIONS.—The coal mines at Connellsville, Broadford, and along the line of the branch roads in Fayette county, Pa., have struck for higher wages. They were getting twenty-five cents per wagon, and now demand thirty-three. They are opposed to company stores and want their pay in cash, instead of part store orders, as heretofore. Throughout this region all the coal mined is used for cooking. In the Youghiogheny district the miners are still at work, but a strike is anticipated. About 1,000 coal miners are on a strike at Streator, Ill. The price heretofore paid has been 90 cents per ton for mining in the winter, and 70 cents in the summer. In view of the general lowering in the price of everything, the company adopted as their scale of prices this year 70 cents for summer mining, and 80 cents for winter. This becoming known, the miners struck on the first of the month, and are still on the strike. It is due the better class of the Streator miners to say that they consider the proposed prices of the company, as payment for miners, to be reasonable, and are disposed to work, but a Mollie Maguire element, which recently came here from abroad, is holding these miners in check. On the 5th inst. a force of workmen commenced their labors, but were ordered by the leading strikers to desist. Though unable to fill its orders. the company has no intention of paying a higher price for mining in the future than that which it has established. At Braidwood, Ill., the miners of the different companies are out on a strike. The price paid for mining from June 1, 1876, up to the present time, has been 95 cents per ton. The Chicago and Wilmington Coal Company now offer to pay 70 cents per ton from May 1 to Oct. 1, and 80 cents per ton from Oct. 1, 1877, to April 1, 1878, and 70 cents per ton for April, 1878. Instead of the men accepting this enormous reduction, they have asked for $1.05 per ton. There are at least 1,500 hands out, and all are well fixed to hold out until they receive the wages asked.—*Inter-Ocean.*

MINERS' WAGES.—We have compiled, from various sources, the following table showing the rates of wages now in force at various mines throughout the country:

LOCATION.	Character of Mine.	Rate.
b. Centreville, Iowa	Coal	3¼ per bushel.
a. Happy Hallow, Iowa	Coal	$16 per week.
Streator, Ill	Coal	$22 per week
Shenango Valley, Pa	Coal and Iron	$15 to $25 per week.
Dusquesne, Alleghany Co., Pa	Coal	3c. per bushel of 76 lbs.
Clarion, Pa	Coal	3c. per bushel.
Cumberland Region, Md	Coal	50c. per ton.
Houtzdale, Pa	Coal	$1.50 per day.
Sewickley, Pa	Coal	2⅜c. per bushel.
Pardoe, Pa	Coal	65c. per ton, screened.
Beacon, Iowa	Coal	3⅜c. per bushel.
Carondelet, Mo	Coal	2⅜c. per bushel.
Myersdale, Pa	Coal	$2 per day.
c. Pekin, Ill	Coal	75c. to 95c. per ton.
Clearfield, Pa	Coal	40c, per ton.
Keystone, Somerset Co. Pa	Coal	50c. per ton.
Steubenville, Ohio	Coal	2⅜c. per bushel.
Kanawha, W. Va	Coal	2⅜c. per bushel.
New Straitsville, O	Coal	40c. per ton.
d. San Juan District, Colorado	Gold and Silver	$4 per day.
Mariposa, Cal	Gold and Silver	$50 per month and board.
e. Smartsville, Cal	Gold and Silver	$2,50 per day; half gold.

a. Laborers wages have been reduced from 85c. to 75c. per day; the coal here is very hard taking 25 lb. of powder for 500 bushels.

b. Rate reduced on the 1st of March, from 4c.

c. 4c. per bushel is paid here for mining gas coal; vein 26 inches thick.

d. Laborers in this district receive from $2½ to $3 per day; while living costs from $5 to $7 per week. Probably a number of men could find work here.

e. The difficulties which now have been existing here for some time have been compromised, sixty men going to work at the above rate; the laborers being allowed to trade where they please. The League wanted to say whom the companies should hire, but agreed to the above without any such restriction. The Mooney Flat tunnel miners go on at $3.50, for twelve hours.

ANNUAL REPORTS OF THE ATLANTIC AND PETHERICK COPPER MINING COMPANIES.—We make the following abstracts from the reports published in the Portage Lake *Mining Gazette*, of the 29th ult:

The Atlantic Copper Mine.—The mineral product of this mine during the year ending with Dec. 31st, 1876, amounted to 1,332·608 tons, which yielded 68.85 per cent., or 1,835,041 lb. ingot copper. The shipments of ingot copper to New York during the year were 1,813,031 lbs., which realized an average price of 21.30 cents per pound, equal to a total of $387,171.37.

The underground expenses for the year were as follows:

Stoping 6,299 cubic fms., at	$17.23	$108,596 93	Timbering, tramming and day work		$27,168 46
Drifting 1,473 feet, at	12.58	18,546 70	Powder, candles, fuse, etc., used on Company account		2,604 56
Sinking 70 feet, at	30.00	2,100 00			
					$159,016 65
The surface expenses					85,394 18

And the stamp mill expenses:

Labor		$29,549 06	Supplies, castings, etc		8,295 05
4,750 tons coal		24,700 00	Total cost of stamping and washing 96,696 tons of rock		64,875 71
824 cords wood (mixed) at	$2	00.. 2,331 60			

Throughout the year we have kept three heads of stamps in operation.

The number of tons of rock stamped was	96,696
Yield of mineral per ton of rock stamped	27·56 lb.
Yield of ingot copper per ton of rock stamped	18·99 "

The total cost of stamping and washing was 67.09 cents per ton. This includes the cost of working the tail-house, keeping the shoots from the railroad to the mill in repair, and the sum of $1,207 83 expended on the improvement of the boilers. Also the cost of painting the mill last summer, and in fact, everything pertaining to the mill. The net operating expenses at mine for the year amounted to $288,026 94. The total average force employed, including officers, was 333, an in, crease of 17 over 1875. Noting the average number of employes, and the amount of mining work done, it will be seen that for each employe, 19.67 cubic fathoms of ground were broken during the year.

The following from the *Northwestern Mining Journal* of the 4th ult. compares he various details of this Company's operations for the years 1875 and 1876:

	1875.	1876.		1875.	1876.
Total product (mineral)	1,089 tons.	1,332 tons.	Tons of rock stamped	80,000	96,696
Product of ingot copper	783 "	917 "	Average per cent. of mineral in stamp rock	1.36	1.37
Percentage of mineral	71.92	68.85	Stamp mill in operation		
Gross earnings	$354 759	$385,252	Cost per ton stamping and washing	87.96 cts.	67.09 cts.
Total expenses	312,179	342,371	Number of cubic fathoms of ground broken	5,628	6,550
Per cent. of expenses to earnings	88	89	Yield of mineral per fm.	387 lbs.	407 lbs.
Net profits	$42,580	$ 42,881	Yield of ingot copper per fathom	278 "	280 "
Surplus undivided	99,585	137,043	Average force employed	316 men.	333 men.
Total mining cost of ingot copper per lb	17.05 cts.	15.69 cts.	Average am't of ground broken for each empl'ye of the force	17.8 fms.	19.67 fms.
Smelting, marketing, etc., per lb	2.86 "	2.96 "			
Average cost per pound, marketed	19.91 "	18.65 "			
Average sales of ingot copper per lb	22.47 "	21.35 "			

The Petherick Copper Mine.—The agent's report covering the operations of this company for 1876, is given in substance in the following:

"The product of this mine during the year was 122,912 lb. The yield per fathom would show this to equal 657 lb., or 36 lb. of mineral to the ton of rock. But as there has been some copper taken from places which could not be worked on contract the yield is not quite as large. 5,563 tons of rock was stamped, consequently the rock treated yielded 1.1 per cent. of mineral. The mill expenses amounted to $5,436 48. The mill expenses includes the breaking of the rock. Both the breaking and stamping of the rock amount to 97 cents per ton. About a year ago there was no ground on the ash-bed proper left to be stoped, and it was our good fortune to find just then another deposit north of the ash-bed which has yielded almost all the copper produced last year. If you consider that we had to open this by drifts and winzes, you must give that deposit the credit of having considerable value, or we could not have done what we did. We drove 360.6 feet on it at an average price of $6 58 per foot. We stoped 187.10 fathoms at an average price of $18 02. From the above figures it is evident that the deposit worked last year can be made to pay handsomely if it is worked on a large scale, because the opening and stoping of it is, comparatively speaking, cheap. The inducement, therefore, of driving the deep adit is, or ought to be, more pressing than ever. Both deposits, the ash-bed as well as the belt worked upon now (wash bed), are very rich, wherever veins or branches cross them, and of these a great many occur west of the old adit. Just now we have taken from such a branch a mass weighing 2,107 lb., aside from a great many small pieces of copper weighing half a ton or more. To conclude, let me say, that without the help of the stock holders the mine cannot be worked any longer. If the debt is not wiped out and money provided for driving the adit and sinking a shaft, it had better be closed. Stockholders on the lake (over 1800 shares are owned there) are anxious to have an assessment called, and I say without hesitation, that if the proper steps were taken to push the work toward making a mine, many men would buy into the concern who now ridicule the way of proceeding."

THE HUKILL GOLD AND SILVER MINING COMPANY.

[WITH SUPPLEMENT.]

This Company was recently organized under the laws of the State of New York, with a capital stock of $1,000,000, divided into shares of $10 each, which are issued fully paid and unassessible.

The property of the Company consists of a mine and mining rights on 1,288 feet on the Hukill lode, and 600 feet of water power on South Clear Creek, in Clear Creek County, Colorado. This mine, which we illustrate in a special supplement, is one of the best known in the State, and has been opened on a scale which, according to reports from our own correspondents, and from those made for the Company by experts familiar with the district, demonstrates the fact that this is a true fissure vein great of width and richness.

The Hukill lode was discovered about the year 1860, but till five years ago, when it was intersected by a tunnel, little work was done upon its development. Since then, however, work has, we believe, been steadily prosecuted with a small force, the profits on the ore taken out paying for the work of development and for the improvements on the property; an expenditure amounting, we are informed, to about $170,000 while the production amounted to about $200,000. We need scarcely tell our readers that it is a very rare case indeed where a mine fully pays for its own development during the first stages, but in this case, it has been effected though the work done has been confined almost exclusively to driving levels and preparing the mine for regular work, and, at the present time, the amount of "ore in sight" is valued at $500,000. This satisfactory and uncommon result is very encouraging and gives good reason to hope that, with prudence and skillful management, a prosperous future is in store for this Company.

The following particulars are taken from reports made for Wm. H. Cushman, Esq., the Treasurer of the Company; by Messrs. J. G. Pohlé, Superintendent, Lebanon Mining Company, of New York; Edward Eddy, Superintendent Silver Plume Con. Company, of Ohio; and Messrs. Teal, Foster & Co., Mining Engineers, Georgetown, Colorado. These reports, and much other information, is given in the prospectus of the Company:

Messrs. Pohlé and Eddy, under date of July 7, 1876, say: The mine is situated on Hukill Hill, about one and a half miles westerly from Idaho Springs, in Clear Creek County, State of Colorado. The vein courses across the hill in the direction of N. 56 deg. E., and has, at its northeasterly boundary line, a vertical height of about 430 feet above the creek level; while near its southwesterly boundary, Clear Creek crosses the lode, thus giving the vein an admirable position for opening it above water-level, by means of an aditz run on the lode—advantages which have been partially utilized by the owner.

The vein or lode was readily traced by its strong outcrop on the surface, as well as by the numerous open cuts and shafts sunk on it—all of these showing blossom rock, interspersed with gold and copper-bearing pyrites, and stained with various colors of green, blue and brown; these large and characteristic outcrops at once indicated it to be a strong and rich ore repository.

We took fair average samples from several of these outcrops, as well as from the various drifts and stopes in the mine, the assays of which will be hereafter given. These samples were taken promiscuously from ten to thirty different places along the course of each drift or stope, the aggregate of which constituted the sample of that particular part of the mine; we also measured the widths of the ore bodies, to guide us in our estimates.

We thus find that, in the space of ground bounded by the first level, 300 feet long and seventy feet high, there are 583 fathoms of ground, estimated to yield four tons of crude ore per fathom. The average of the three sample assays made from here, shows it to contain:

Gold	2·41 ounces,	= $50
Silver	8·33 "	= 10
Total value per ton		$60

As this surface ore cannot be hand-dressed, it would only yield a slight and practically unimportant profit by its direct sale to the Boston Colorado Smelting Company, at Black Hawk, where most of the products from this mine have hitherto been sold, we estimated it, in its present undressed condition, as of no immediate money value, and classed it as "Reserve No. 2;" but that, with suitable dressing, it can be easily and cheaply concentrated in the ratio of four to one. In order to find the value of the product, we concentrated, experimentally and separately, the three samples heretofore alluded to, in the ratio of four to one, and found the average of the three assays of the concentrated products thus obtained to yield (notwithstanding the heavy loss by imperfect means of concentration),

Gold	3·88 ounces,	$75.00
Silver	15·83 "	19.20
Total value per ton		$94.20

Which product, if sold at the Black Hawk Works, would there yield $55.39 per ton, in currency. As this material exists in vast quantity, and was found to be the lowest grade in the mine, a suitable concentrating mill for its economic concentration, would be requisite to work this surface ore with profit.

Between the first, second and third levels our measurement gave us 405 fathoms, less 260 fathoms already stoped out, leaving a balance of 145 fathoms standing, each fathom estimated to yield eleven and a quarter (11¼) tons. The ore here found is properly designated smelting ore, and its average width estimated to be three feet, being in places over five feet in width, and nearly solid ore. The ore is a mixture of iron and copper pyrites and galena, carrying gold and silver. The samples gave an average yield of:

Gold	5·27 ounces,	$105.00
Silver	94·27 "	112.80
Copper	7·50 per cent.,	15.00
Total value per ton		$232.80

or 1,631 tons, at $160.52, the price paid for this grade of ore at Black Hawk, would give a gross yield of $261,848.00.

The argentiferous galena occurring in this ore-body is interspersed in large blotches and patches constituting about 2 per cent. of the whole, most of which can be separated by hand so as to yield over 60 per cent. in lead; a separate assay of this galena showed it to yield:

Lead	70 per cent.,	$50.00
Silver	29 ozs. per ton,	34.80
Total value per ton		$84.80

In addition to this three feet ore-body, there are 145 fathoms of equal average richness scattered on either side of this streak, but only available with the aid of concentrating machinery; this scattered ore would yield about two tons per fathom, =290 tons at $160.52, =$46,550. As this cannot be profitably used at once, without the intervention of machine dressing, we classed it as Reserve No. 2. Between the second and third level, we measured off another piece of ground, 100 x 70 feet, equal to 194 fathoms, estimated to yield three tons of ore per fathom, and containing an average of three ounces of gold and thirty-five of silver per ton, which would realize at Black Hawk, at the rate of $61.21 currency, =$35,624. A portion of the ore obtained from this part of the mine could be more remunerative after passing through a concentrating mill; we classed it as Reserve No. 1.

The third, or lowest level above the creek of this great mine, has been intersected by a wide cross-cut tunnel, at a distance of about 90 feet from its mouth and just westerly from its intersection with the lode, a shaft about 80 feet deep has been sunk on the lode and a short drift run from the bottom of the shaft; at the time of our investigation we found the shaft full of water and workmen engaged erecting hoisting machinery for the purpose of taking the water out; we were credibly informed by the miners that there was ore in the shaft. This third level was 170 feet long and shows ore on the floor and roof of the same as well as in both faces or breasts of the same; in the northeasterly face and floor the ore body was over five feet wide and nearly solid. We estimated that portion of the ground lying below this level, for one quarter of the depth of the shaft, to contain 89 fathoms carrying ore at the rate of 7¼ tons per fathom, and of the same average value as that obtained just above this ground which, at the Black Hawk price, of $160.25 per ton, would be $107,066.

The above values are those that would be realized in currency at the present low prices paid at Black Hawk for ores of this class, the price of silver on the date of our calculations being $1.04 per ounce, and the premium on gold we fixed at ten per cent. As the greatest value of the ore from this mine consists in its gold, this depreciation of silver will affect its value but slightly, and favorably when its value rises above the point of our basis of calculation.

COST OF MINING AND MARKETING.

The quartzose portion of the lode being hard and carrying the best ore, is worth about $50 per fathom to stope out, including the preliminary requisite drifts, while the softer conglomerate part of the lode would be worth about $35 per fathom, including necessary drifts and timbering, or an average, on the whole exposed underground workings, of $42.50 per fathom, which, at an average of eight tons, would be equal to $5.31 per ton. The freight from the mine to Black Hawk is about $5.00 per ton, or a total of $10.31 for mining and freight.

As the linear extent of this vein on the Hukill claim is 1,288 feet, and as the longest drift on the vein is only 300 feet, there is left a vast amount of ground above the creek level still to be explored. As the surface outcroppings over this ground are auriferous, and apparently as rich as any on the surface from which samples were taken, it is but fair to believe that the mine under this ground is as rich as any part of the mine already opened.

The gold contained in this surface gangue rock or blossom, exists in two distinct conditions, viz.: free gold, mostly in an impalpably fine powder and capable of amalgamation; in the other condition it is combined with iron and copper pyrites and incapable of amalgamation. To render this surface ore practically valuable, a suitable concentrating mill, with raw amalgamating arrangements attached, would have to be constructed near the mine; the estimated cost for both, capable of treating 40 tons per day of 24 hours, would be in the neighborhood of forty thousand dollars. This concentration and amalgamation could be done at a cost not exceeding three dollars per crude ton of rock.

In order to arrive at the value of reserves exposed to miners' sight, we have divided them into two classes, namely, Reserves Nos. 1 and 2. The first embraces all that class of ore which, when blasted or broken down, may be profitably sold at once, without mill dressing, and the Second Reserve those which would require concentration before they could be sold with much profit. A recapitulation will show this, thus:

Reserve No. 1,	1631	tons,	at	$160.52	$261,848		
" " 1,	667	"	"	160,52	107,066		
" " 1,	583	"	"	61.25	35,624		
						404,538	
" " 2,	583	"	"	55.39	$32,292		
" " 2,	200	"	"	160.52	46,550		
						78,842	
						$483,380	

A third reserve may be called all that vast quantity of surface ore lying beyond and northeasterly of the end of the first level, but which, for the want of sufficient development, cannot be properly estimated.

The following assays of our samples were made by Mr. Ernest le Neve Foster, assayer at the "Silver Plume Concentrating Company, of Ohio:"

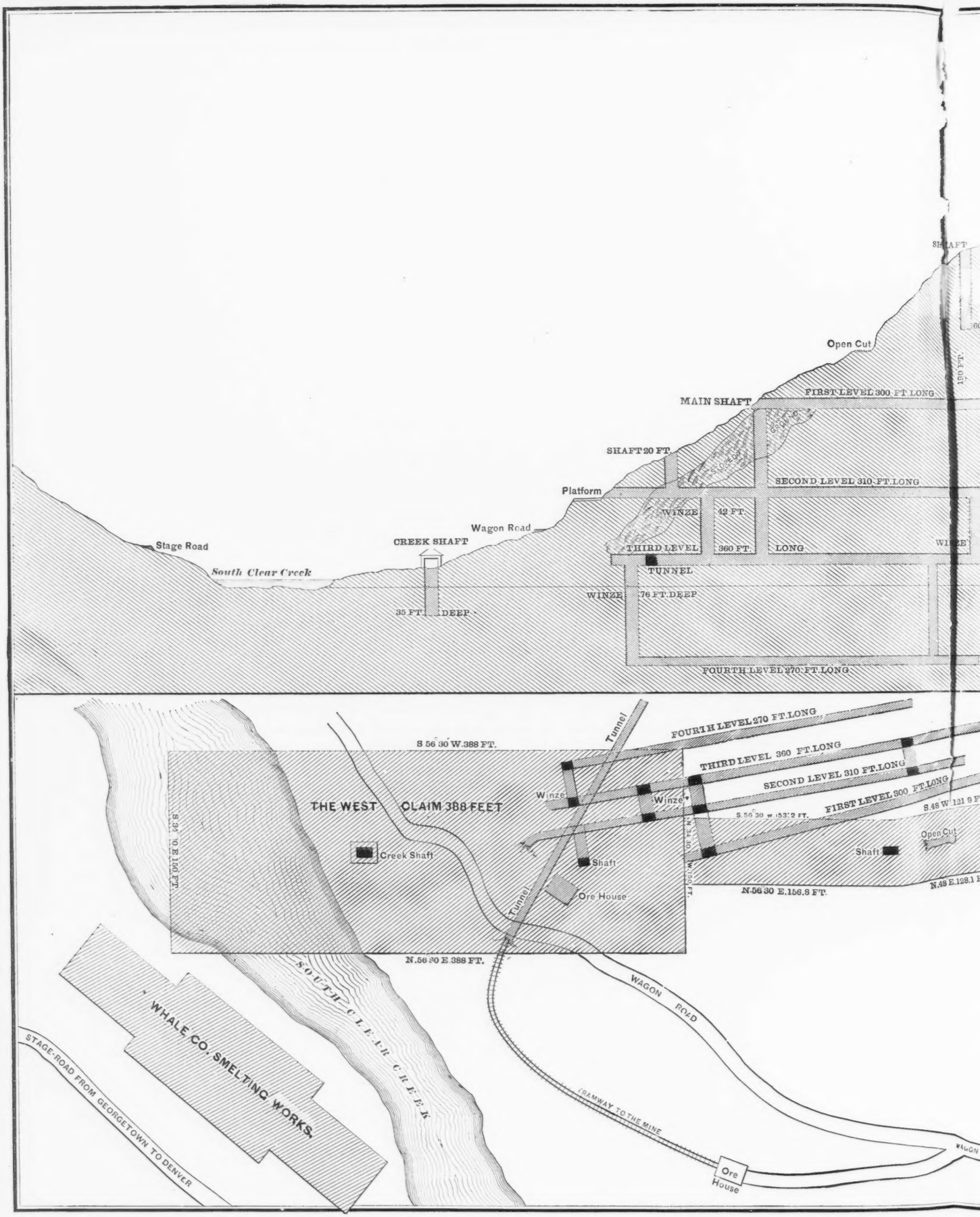
	GOLD. Per Ton.	SILVER. Per Ton.	COPPER. Per cent.
Upper open cut	2·48 oz.	12·25 oz.	
Lower " "	2·33 "	5·25 "	½
Roof of first level	2·02 "	7·50 "	
First level, bottom stope	4·37 "	14·50 "	1½
Stope between 1 and 2 level	7·00 "	61·25 "	8
" " 2 and 3 "	4·07 "	25·66 "	1
Third level, breast and roof	4·66 "	196·00 "	7½
Product concentrated from upper open cut	3·50 "	20·50 "	
Product concentrated from lower open cut	3·79 "	17·00 "	
Product concentrated from first level (conglom)	4·37 "	10·00 "	

Connected with the mine is a fine water power available throughout the year for the hoisting purposes of the mine, and furnishing power for the concentrating and amalgamating works. The property also embraces a fine mill site large enough for all the uses of the mine and works connected therewith.

Messrs. Teal, Foster & Co., under date 21st Sept., 1876, report: We visited the Hukill mine, on the 19th inst., measured up and estimated the amount and value of the ore reserves now in sight in the mine. We made careful measurements of the ore vein in numerous places, in every shaft, winze, level and stope, finding it to be from six inches to four feet in width, and in several places five feet and more. The ore is an auriferous and argentiferous copper and iron pyrites principally, but containing also peacock copper ore, and from 2 to 3 per cent. of galena in the upper levels.

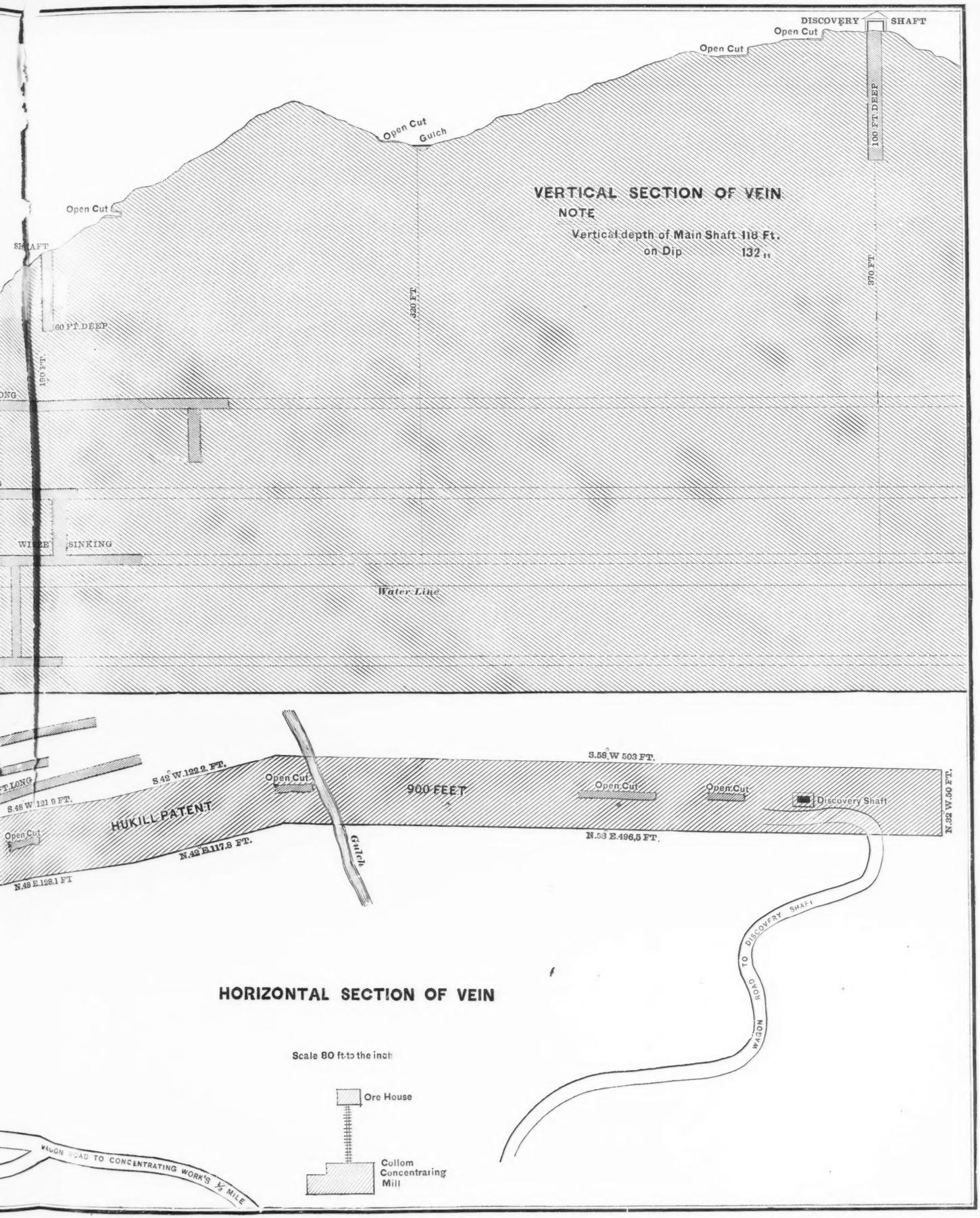
From our measurements we found that there are 1,453 fathoms of stoping ground opened, which we estimate to contain at least 7,182 tons of smelting and concentrating ore, worth about $536,385, divided about as follows:

IN THE BACK OF THE FIRST LEVEL,	
500 fathoms, containing 2¼ tons of concentrating ore per fathom, worth $30 per ton—1,125 tons, worth	$ 33,750.00
IN BACK OF SECOND LEVEL,	
17 fathoms, containing 3 tons of concentrating ore per fathom, worth $60 per ton—51 tons, worth	3,060.00
363 fathoms, containing 2 tons of concentrating ore per fathom, worth $30 per ton—726 tons, worth	21,780.00
363 fathoms, containing ¾ ton smelting ore per fathom, worth $120 per ton—272 tons, worth	33,240.00
IN BACK OF THIRD LEVEL,	
235 fathoms, containing 7 tons of smelting ore per fathom, worth $120 per ton—1,645 tons, worth	197,400.00
235 fathoms, containing 4 tons of concentrating ore per fathom, worth $35 per ton—940 tons, worth	32,900.00



THE HUKILL GOLD A

CLEAR CREEK COUNT



LD AND SILVER MINE,

K COUNTY, COLORADO.

IN BACK OF FOURTH LEVEL,

255 fathoms, containing 6 tons of smelting ore per fathom, worth $120 per ton—1,530 tons, worth	183,600.00
255 fathoms, containing 3½ tons of concentrating ore per fathom, worth $35 per ton—893 tons, worth	31,255.00
Total, 7,182 tons, worth	$536,385.00

We consider that this estimate will, if anything, fall short of the actual amount and value of the ore in sight, when the ground comes to be stoped away.

From these reports the Hukill Company is shown to possess a very valuable property, and advices from our own correspondents confirm this opinion and lead us to expect that it will be able to earn regular monthly dividends of from one to two per cent.

Mining investments being as yet a novelty on this market, erroneous impressions may prevail with regard to the value of such property, we therefore repeat the remarks already so often made by us in these pages.

A good mine, though, of course, the very first essential, is but one element in a successful mining enterprise. Prudent management is one of scarcely secondary importance. When mining stock is issued fully paid and unassessable this element requires that a large bank balance should be kept to the credit of the company, and that the exploration work in the mine should be steadily pushed so as to hold constantly large reserves of ore in sight.

The Hukill has made an excellent commencement in this latter respect, and we understand it is to be a guiding policy of its administration to secure both of these conditions of permanent success.

We have been promised official monthly reports of the work done at the mine, and these will prove of great interest and value to those investing in the Company's stock, and will undoubtedly tend to make it popular. We have great pleasure in calling the attention of those who are disposed to invest in mines to the stock of this Company, for not only do we believe it to possess the elements of success, but investors are offered every facility to ascertain for themselves that the representations made are fully justified by the facts.

ROYALTIES IN COAL MINING.

The following interesting information is taken from the last report of Henry S. Poole, Esq., Inspector of Mines for Nova Scotia :

In England and Ireland the Sovereign is entitled to all gold and silver, whether found in the demesnes of the Crown, in the highways, or in the lands of private persons. The Crown is also proprietor of the soil and of all the minerals beneath the soil in the Forest of Dean, subject to the right of the "free miners," of that district to a grant from the Crown to work the minerals upon payment of a royalty; and in the parts of Derbyshire where the mining customs prevail Her Majesty, in right of her Duchy of Lancaster, is the owner of the lead mines, whilst any of Her Majesty's "liege subjects" are entitled freely to enter upon and to work those mines without even the permission of the owner of the soil or of Her Majesty.

In Scotland the Crown has no right, not even to the precious metals, but only to a royalty payable out of the produce. The eldest son of the Sovereign has an indisputable title to all minerals under certain lands in Cornwall belonging to private persons. In the north of England one person is not unfrequently entitled to the coal, whilst another is entitled to the ironstone; one may be the owner of the seams of coal, whilst another may possess the seams of sandstone or other like substrata; and two or more seams of coal under the same lands may be sometimes vested in different proprietors.

These instances of distinct ownerships and rights are analogous to the civil law. Under the Roman Empire, all mines, minerals and quarries, and indeed the soil itself, belonged to the state by right of conquest. In some of the provinces on the allotment of land to private individuals the conquerors reserved the rights to the minerals for the benefit of the state. But there was no universal law, and variations were made in the laws of different provinces by successive emperors, as well for state purposes as for the advantage of private persons.

Gratian gave a general permission to take minerals from the lands of private persons on paying one-tenth to the state and another tenth to the owner. His decree was adopted by Valentinian and Theodosius Maximus.

The Emperor Valentinian published a rescript which allowed the state mines to be worked by private persons on payment of a royalty, the state retaining the right of preemption when the gold found exceeded a certain quantity. The royalty was called *canon metallicus* and was fixed at eight scruples in gold dust for each worker in the mine.

Merivale, in his History of the Roman Empire, writes, "Over the treasures concealed beneath the soil, the state claimed the same paramount dominion as over the produce of its surface. The mines and quarries throughout Italy and the provinces were held in part by the Roman people, and farmed, like the land tax, to private speculators; in part conceded to private proprietors, with the reserve of a fixed rent for the privilege of working them."

In Gamboa's Mining Ordinances in Spain it is stated, that, "By the civil law, all veins and mineral deposits of gold, silver and other precious stones, belonging if in public ground to the sovereign, if in private ground to the owner of the soil, subject to this condition in the latter case, that, if worked by the owner, he was bound to render a tenth part of the produce to the prince, as a right attached to his crown; and if worked by any other person, by consent of the owner, the former was liable to the payment of two-tenths, one-tenth to the prince and one-tenth to the owner."

Germany is the country where it is supposed the sovereigns first succeeded in establishing their pretensions to a royalty on mines.

The law for the Prussian States formerly imposed a duty of a tenth on the raw material, and whether the mines were worked or not there was a small duty of one thaler per annum paid on the concession. Subsequently the duties were reduced; and a new decree in reference to all mines dated January, 1865, reduces the royalty to one per cent. There were also formerly innumerable taxes and commissions paid by the mines, to cover the costs of scientific and financial administration, all of which are now abolished, and instead thereof a regular tax of supervision, amounting to one per cent. of the value of the product, is levied on mines in actual operation only.

The ancient royal rights of the state of Austria extended to every kind of mineral, and the new law of May 22, 1854, confirms those rights. The sovereign is now entitled to a double duty, the one fixed depending upon the area of the mine, the other variable, being one-tenth of the raw product payable in money.

Spain.—By a decree of Amadeo I., dated 24th July, 1871, concessions for working mineral substances were given in perpetuity, subject to an annual quit rent per hectare, fixed as follows :—For precious stones and metalliferous substances, iron excepted, ten piacetas ($2) per hectare Iron, combustible substances, etc., four piacetas (80c.). These latter, by a decree of the government in 1868, were subject to an annual quit rent of $3 per hectare.

France.—By the Code Napoleon, each mine paid a certain fixed sum per annum, according to the size of its field, and also a tax of five per cent. on its net profits. To this amount one-tenth was added to cover incidentals. The net profit was ascertained by subtracting the current expenses only, not the cost of permanent improvements, from the total production. These taxes amounted in the aggregate to about two per cent. of the gross product; and since the 1st of January, 1865, they have been replaced by a single tax of that amount. It is, of course, much easier to collect a tax on gross receipts than on net profits, and the result is the same to the mines. (*Raymond's Statistics*, 1869.)

Mexico.—Since 1822 there have been some modifications of the fiscal laws. The total amounts of the present duties are four and a half per cent. on silver, and three per cent. on gold.

Italy.—By the mining laws of 1859, arts. 59-61, every concessionaire shall pay to the state a fixed tax and a proportional tax. The fixed tax shall be 50 centimes for every hectare (2½ acres) of land included in the concession, and must in no case be less than 20 lire ($4). The proportional tax shall be five per cent. on the net produce of the minerals, and will be settled yearly by the governor of the province, on the report of the mining engineer. Art. 63. The government may remit in whole, or in part, the proportional tax payable by the concessionaire in case of heavy expenditure, extraordinary work, or on account of damage suffered from accident, not imputable to negligence. Such remission must be by royal decree.

These references to the sovereign's right to minerals in Europe have been taken, and chiefly almost verbatim, from Rodger's book on the Law of Mines, Minerals and Quarries. In Nova Scotia, the Crown having taken possession of the country, claimed both the land and the minerals, and having distinguished between them by reserving the latter in the grants of land to settlers, the rights of the Crown to the minerals here stand in a different relationship to what those of the sovereigns of Europe do to the miners of that Continent.

In many of the cases quoted, the royalty claimed became a special tax on the mining industry to the Crown, but the dues called royalty in Nova Scotia are more comparable to the dues also called royalty paid to the freeholders in England, and to those similarly named and paid to the landowners in the United States.

Turning to the Statutes of the United States, it will be seen that, by a resolution of the Senate and House of Representatives of the United States of America in Congress assembled, dated 30th January, 1865, it was provided that no act passed in the first session of the 38th Congress, granting lands to States or corporations, should be so construed as to embrace mineral lands, which in all cases were declared to be reserved specially to the United States, unless otherwise specially provided.

A subsequent act passed in the following year declares that mineral lands of the public domain, both surveyed and unsurveyed, are to be free and open to exploration and occupation by all citizens of the United States and those declaring their intentions to become citizens, subject to such regulations as may be prescribed by law. A claimant to a mine on a vein may obtain a patent from the General Land Office, after complying with certain regulations, on payment of five dollars for each acre.

Coal lands are by the same ordinance regulated to be sold at twenty dollars per acre, when they are within fifteen miles of a completed railroad, and when they are beyond, at ten dollars per acre. An individual may ente any area not exceeding 160 acres. An association may enter any area not exceeding 320 acres. An association of more than four persons duly qualified, who shall have expended not less than $5,000 in working and improving any coal mine, may enter on an area not exceeding six hundred and forty acres. The *opening* and *improving* of a coal mine in order to confer a preference right of the purchase must not be considered as a mere matter of form; the labor expended and the improvements made must be such as to clearly indicate the good faith of the claimant. (See the Revised Statutes of the United States relating to Mineral Lands and Mining Resources, by W. A. Skidmore.)

TO BE CONTINUED.

NOTES.

STEEL AXLES.—The Bethlehem Iron Company, on the 6th of March, rolled thirty steel axles for railroad cars, and sawed them to their proper length ready for the lathe. They were made for the Lehigh Valley Company, and should they prove satisfactory, they will make a separate branch of business and one which will no doubt prove lucrative.—*Polytechnic Review.*

GROWTH OF CORALS.—A coral formation, five feet in height and six feet diameter at the upper, and two feet diameter at the lower end, was found attached to the submarine cable near Fort Darwin, in Australia. Since this cable has not been in position for more than five years, the growth of coral must be considerably more rapid than has been estimated by naturalists.—*Oest. Montan. Ztg.* xi. 9.

DENSITY OF MERCURY.—A paper was read before the Royal Society on the 15th March, by Professor J. W. Mallett, LL.D., giving the results of some recent determinations of the density of solid mercury. The final mean of all the determinations gives 14·1932 as the number representing the density of solid mercury at its fusing point, as referred to water at 4° Cent., taken as unity.—*The Engineer.*

A. CARR, OF 43 CORTLANDT STREET, NEW YORK, has issued a beautifully illustrated supplement to his large catalogue of brass work and supplies for plumbers, engine builders, steam and gas fitters. Mr. Carr also manufactures and deals in the Selden pumps, gas and water pipe, forges, blowers, tools, etc. His catalogues, which can be obtained on application, are very useful books in an engineer's office or hardware store.

FRENCH MINES.—M. Christophle, the French Minister of Public Works, has lately addressed an important circular to the prefects of all the departments, on the state of the various mines which have been opened during the last forty years. Out of about 1200 of these mines no less than 700 have either been abandoned or have ceased to be worked. Their existence in this unsatisfactory condition is a constant subject of complaint from the inhabitants of the districts in which they are situated from members of the Legislature, from the councils-general, and from a number of engineers and other persons who would in some cases be glad to begin or continue the works which are now entirely neglected. This being the case, the prefects are to verify the above statistics, and to notify to the concessionaires or owners of the mines in question that they must, within two months, proceed to carry out such works as may be necessary to make the mine useful. If within the time no steps have been taken, the minister will consider the propriety of altogether revoking their license and cancelling the concession originally obtained from the State.—*The Engineer.*

Antigalline is a new chemical compound, discovered by H. R. Procter, F.C.S., Shields, which prevents the fermentation in solutions containing tannic acid, and their change into gallic acid. It also arrests the change of color which is so prejudicial to tanners. It will be of great importance to American tanners if the deep-red color of the hemlock extract can be kept down.—*The Engineer.*

The Swan Creek Lead Mines, of Christian County, Mo., are very promising, having shipped 210,000 lb. pig lead last year, and for the first two months of this year over 70,000 lb. mineral have been raised; all being done with an average of twenty men, most of whom are farmers, consequently the character of the mining is very imperfect. All that is needed here is capital to develop a very productive lead district.—*Mines, Metals and Arts.*

The Georgia Gold Mines.—From our Southern exchanges we learn of increased activity at the mines of the Gold Belt:

The Jones Gold Mine Company, of North Carolina, has recently struck a new vein, in which gold is found in great abundance. One lump of ore, weighing about 3 lb., and said to be worth $700, was recently picked up in the mine.

The Gainesville (Ga.) Southern says: "Besides the regular stream of gold sent off from the mines to Atlanta and other markets, there were sold by surface miners (composed of men, women and children) in Dahlonega, during 1876, dust to the amount of $47,716. There was a considerable quantity sold in Gainesville, which is now quite a market for the sale of gold dust."

The Findley and Benning Mines are working steadily with about their usual yield. The shaft at the Findley will be completed, when they have commenced drifting to strike the old vein, which has heretofore been one of the richest known in the country, and will doubtless show as great value when struck again at the new point, 40 feet below where it was so rich. The hydraulic ram at this mine has been overhauled and remodeled, and is now working regularly, throwing a large body of water daily into the reservoir on top of the mountain. With this water the company is rapidly driving a cut towards the famous Sand Vein, which, with reasonable success, they will probably reach within a month or two. McIntosh & Blackmer's mill, on Fish Trap, is a five-stamp mill, run by steam, and the vein is one of the easiest ever discovered in this country. There is plenty of ore, and instead of being imbedded in hard slate, it is in soft slate or clay, requiring no blasting. The tunnel is perfectly dry. The company is now incorporated.

The Burnt Hickory Gold Mines.—These valuable mines are situated in the third district of the third section of Paulding County, Ga., and received the cognomen of Burnt Hickory Gold Mines by the intruders in the early discovery of gold in that section of the State. We are satisfied that no portion of the gold belt extending from this to the mines of Alabama yielded more of the precious metal than did the Burnt Hickory Mines from past discoveries up to the discovery of gold in California. Recent rich discoveries have been made in these mines, and machinery will soon be introduced and quartz mills erected for their proper development.—*Dahlonega Signal.*

Hydraulic Ditch.—A Georgia canal seventeen miles long has been cut to convey water to the Nacouchee mine, in White County, Ga., which enables the miners to use the hydraulic process on 10,000 acres of rich mining property.

Assessed Valuation of Coal and Mining Incorporations in Allegheny County, Md.—The following table, which we take from the Cumberland *Alleghenian* of the 3d inst., gives the valuation of different mining companies operating in Allegheny County for the years 1866 and 1876:

Names.	1866.	1876.	Names.	1866.	1876.
American Coal Co	$450,000	$437,690	Grant Coal Co	$35,000	$20,000
At. and Geo. Ck. Coal Co.	150,000	185,000	Maryland Coal Co	660,000	600,000
Blaen Avon Coal Co	50,000	50,000	New York Mining Co	75,000	....
Borden Mining Co	250,000	240,000	New Central Coal Co	650,000	600,000
Cumberland Coal & Iron Co	138,006	150,000	National Coal Co	28,893	25,000
Ches. & O. C. & Trans. Co.	12,000	15,000	Potomac Coal Co	120,000	120,000
Consolidation Coal Co	2,940,000	3,075,000	Redmont Coal Co	50,000	50,000
Coal, Oil & Iron Co	20,000	20,000	Swanton Coal Co	40,000	50,000
Cumberland Cement Co	40,000	40,000	Union Mining Co	250,000	250,000
Cum'b Cast Steel Co	28,800	30,800	Wether's Mining Co	12,000	12,000
Franklin Coal Co	50,000	50,000	Cumberland Gas L. Co	40,000	100,000
Fawn Ash Coal Co	35,000	15,000	Frostburg Gas L. Co	16,666	16,898
George's Ck., C. & I. Co.	550,000	660,000			

Toughened Glass.—The following particulars are taken from a prospectus recently issued by an English company which has been organized, with a capital of £60,000, to purchase and work the process recently patented by Mr. Fred. Siemens, of Dresden, for toughening, hardening and compressing glass, the exclusive license to work which for the United Kingdom of Great Britain and Ireland, the Channel Islands and the Isle of Man has been agreed to be purchased for the sum of £22,500. The vendor guarantees the shareholders a dividend of 10 per cent. per annum during the first three years. It is not intended at present to call up more than half the capital. The method of manufacture adopted is one producing a perfectly clear and durable substance, which can be used for most purposes for which glass and earthenware are now employed. As the relative weight of the new glass and the ordinary glass now in use is about the same, and as the durability of the former is about ten times that of the latter, an immense advantage may be expected to accrue in the use of the new glass. A few other of its advantages may also be pointed out:

1. It will not chip or crack as is the case with ordinary glass.
2. It can be made of such strength as to be almost unbreakable.
3. It can be produced at nearly the same cost as ordinary glass.

Besides window, roofing glass, etc., it is proposed to manufacture (out of enameled glass) plates, dishes, and other articles, which present an appearance far superior to common earthenware. It is expected that the manufacture of this new article will create a complete revolution in the glass trade, more especially perhaps with regard to the export trade. The importers of glass from England into foreign parts know to their cost that the amount of breakage in transit varies from 30 to 40 per cent., and it is obvious that the reduction of this percentage to a minimum must most materially influence their trade. The furnaces and apparatus required to harden, toughen and compress the glass can be erected and put in working order within three months from the commencement of operations.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending April 7.

Tons of 2,240 lb.	1877.		1876.	
	Week.	Year.*	Week.	Year.*
Wyoming Region.				
D. and H. Canal Co	35,494	498,690	53,121	374,428
D. L. and W. RR. Co	38,978	498,528	37,221	294,729
Penn. Coal Co	26,633	241,331	18,542	236,659
L. V. RR. Co	29,634	252,406	19,585	192,000
P. and N. Y. RR. Co	339	11,018	742	5,038
C. RR. of N. J	24,934	305,888	42,780	190,054
	156,012	1,808,461	171,991	1,292,908
Lehigh Region.				
L. V. RR. Co	64,269	604,723	64,730	420,776
C. RR. of N. J	32,369	306,591	23,918	186,018
D. H. and W. B. RR	345	4,861	378	10,290
	96,983	916,175	89,026	617,084
Schuylkill Region.				
P. and R. R. RR. Co	126,170	1,075,020	134,654	581,626
Shamokin & Lykens Val.	8,883	94,366	10,905	63,722
	135,053	1,169,386	145,559	645,348
Sullivan Region.				
Sul. and Erie RR. Co	405	3,433	1,006	15,373
Total	388,453	3,897,455	407,582	2,570,713
Increase	—	1,326,742	—	—
Decrease	19,129	—	—	—

*Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about five per cent. of the whole production.

Receipts of Coal at Boston, for the week ending April 6, and years from Jan. 1.

Tons of 2,240 lb.	1877.		1876.	
	Week.	Year.	Week.	Year.
From				
Alexandria and Georgetown	—	1,298	440	4,602
Philadelphia	8,480	68,839	8,458	57,530
Baltimore	2,360	19,462	2,070	22,602
Other places	4,030	44,323	2,050	45,587
Great Britain	—	707	—	2,126
Nova Scotia	160	804	—	199
Total	15,030	135,433	13,018	132,646

Perth Amboy business: Tons.

Received for the week	24,387
Shipped for the week	25,671
On hand April 7	141,706

The Exports of Coal from Baltimore for the week ending April 6, were 1,477 tons, and since Jan. 1st, 8,736 tons as against 10,860 tons for the corresponding period of 1876.

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Piedmont Railroads amounts to 79,650 tons, as compared with the corresponding period in 1876.

Belvidere Delaware RR. report for week ending April 7.	Week	Year. 1877.	Year. 1876.
Coal for shipment at Coal Port (Trenton)	512	1,003	20,049
" " " South Amboy	17,369	142,785	106,703
Coal for distribution	3,974	44,116	35,761
Coal for Company's use	2,696	20,327	13,838

The production of Bituminous Coal for the week ending April 7, was as follows:

Tons of 2,000 lb., except where otherwise designated.

	Week, Tons.	Year, Tons.
Cumberland Region, Md..		
Tons of 2,240 lb	42,395	196,838
Barclay Region, Pa.		
Barclay RR. tons of 2,240 lb	6,750	99,890
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	3,629	39,555
*East Broad Top	1,051	11,745
Clearfield Region, Pa		
*Snoe Shoe	726	12,590
*Tyrone and Clearfield	35,062	316,925
Allegheny Region, Pa.		
*Pennsylvania RR	4,048	48,110
Pittsburg Region, Pa.		
*West Penn. RR	3,660	46,898
*Southwest Penn. RR	579	14,136
*Penn & Westmoreland gas coal, Pa. RR.	12,332	198,489
*Pennsylvania RR	8,128	93,355

*For the week ending March 28.

The Production of Coke for the week ending March 28.

Tons of 2,000 lb.	Week.	Year.
West Penn. RR	330	20,426
Southwest Penn. RR	14,236	153,269
Penn & Westmoreland Region, Penn. RR.	1,439	19,900
Pittsburg, Penn. RR	949	35,370
Total	16,954	228,965

COAL TRADE REVIEW.

New York, Friday Evening, April 13, 1877.

Anthracite.

Under the influence of the combination scare a very considerable business has been done; but as everybody has been so very anxious to sell, and at prices as low, if not lower than previous to the attempt to form this organization, buyers are now not so anxious.

Messrs. Gowen, Dickson and Sayre, the coal combination committee appointed "to report a proper plan to provide for adequate security being given to guard against any interest overshipping its proper quota," reported at a full meeting of the representatives of the several coal interests held at the office of the Delaware and Hudson Canal Company, on Monday, instead of Tuesday as agreed upon last week. The question appears to have been speedily disposed of; Mr. Clark, the receiver of the Lehigh and Wilkes-Barre Coal Company, not being authorized to give a guarantee, and some of the others probably not being able to do so. It was also considered inexpedient to make any immediate advance in prices or curtailment of production; but it was resolved to advance prices 50 cents per ton on June 1, and to enforce the proper curtailment of production from that time.

The mountain so long in labor has at last been delivered of its portentious offspring. And what a birth! It is ridiculous to suppose that the childish arrangement here proposed should exert any beneficial influence upon the trade. The whole question seems to resolve itself into two propositions:

1. If the combination be simply to restrict production and not regulate prices, then the company that is willing to sell at the lowest price will be able to dispose of more than its quota, and will certainly refuse to have its business curtailed and cost of production increased because its neighbor insists upon holding its coal for higher prices and larger profits, or to cover higher cost due to less economical management or natural disadvantages of geographical position.

2. If the proposition be to regulate prices as well as production, or prices alone, then experience has shown that it is impossible to secure good faith in the execution, and Mr. Gowen's plan for pooling the coal is the only way in which this proposition can be carried out effectively, for it absolutely destroys competition, and thus accomplishes the aim and object of combination. Yet the other companies all voted against the adoption of this, and it will certainly never be acceptable, for it excludes personal ambition, and closes the field to individual business enterprise.

It is tacitly admitted that the new programme cannot be enforced at present, but we are told that it will go into force June 1, when prices are to be advanced 50 cents per ton. In the mean time it is possible that coal is not being sold for delivery beyond that date; but it is probable that large contracts are being taken for coal to be delivered in April and May without guaranteeing prompt delivery; and if the companies really had any faith in the restriction becoming operative in June, stocks would by that time have accumulated to such an extent that September would have arrived before even the strict compliance with the restrictive clause of the programme could exert any influence on the market.

The effect of the combination movement thus far has been injurious to the small companies and individual operators. The uncertainty as to what railroad freights will be, prevents them from making season contracts for coal to be delivered along the lines of the roads, and as these markets are not "competitive" the large companies are making great and successful efforts to secure this business at prices lower than have heretofore been quoted. The consequence of this will be, that the individual operators will be driven to the "competitive" markets to dispose of their coal, and under the close competition which will result no programme regulating prices can possibly be maintained. Large quantities of coal are reported to have been sold by the Philadelphia & Reading Coal and Iron Company, within the past ten days, at prices below those

contemplated in the combination scheme, and a very notable feature of these sales is that some of the coal is to go to Albany and Troy, and to Hudson, for transhipment to cars of the Boston & Albany Railroad. That the Reading Company should be able to send coal from Philadelphia past the shipping wharves of the Pennsylvania Coal Co. and the Delaware & Hudson Canal Co., on the Hudson River, and to compete successfully with these companies in what they have hitherto regarded as exclusively their own field, is certainly worthy of note, and perhaps explains, in part, the extreme anxiety of those companies for a combination that would render this audacious rival harmless.

Let us hope that this latest ridiculous *fiasco* in combination-making will satisfy, for the present, the gentlemen engaged in it, and induce them to look for some more solid foundation than this temporary and dangerous expedient on which to build a prosperous future for their companies.

The exodus of miners from the coal regions, which we chronicle week after week, and the stoppage of "dead work" in a large number of collieries, will bring about, perhaps sooner than is expected, that restriction in production which is now sought in a less legitimate manner, and it will do so in a way that will allow honest, prudent and skilful management its just advantage and reward.

The course which the ENGINEERING AND MINING JOURNAL has adopted on the combination question has not been prompted by any factious opposition to the companies or their managers, but from a firmly rooted conviction that our policy is that which will best promote the interests of the whole trade and of those holding the securities of the great companies. We pretend to no infallibility, but the statements we make are more than the expression of mere individual opinion; and we may be permitted to believe that the remarkable uniformity with which subsequent events have confirmed the opinions expressed with regard to questions of trade, wages, prices, and demand in these pages during the past three years, have not been mere accidental circumstances, but the result of a careful, constant and thorough study of the whole field of the coal trade, bituminous and anthracite, foreign and domestic, and a careful comparison of the views of those best informed in each special department of the same. The course of trade in any department of commerce or industry is governed by fixed laws; and the intensity and direction of its storms and cyclones can be predicted precisely as those of the still more unstable atmosphere—by a study of accumulated data. It is possible, of course, for a storm to be retarded or deflected temporarily by some important obstruction, but its general course and intensity can be predicted with a great degree of accuracy.

The storm in the coal trade, and particularly in the anthracite trade, has been very severe and has not yet quite expended itself, but its force and direction were clearly forecasted, for the conditions which caused it were well known.

The production of anthracite coal for the week ending April 7 was much larger than any week this year, being 388,453 tons as against 316,503 tons the week previous, and 407,582 tons for the corresponding week of 1876. The total production from January 1 was 3,897,455 tons as against 2,570,713 tons for the like period of last year, showing an increase this year of 1,326,742 tons. The Reading Company has greatly increased its shipments, which are nearly double what they were a month ago, and about one-third of the whole production. Its shipments now are at the rate of 6,500,000 tons per annum. So soon as the companies agree that the combination is a farce, with the large supply of orders this company has already booked, we may anticipate some very large weekly shipments.

Bituminous.

The production of Cumberland coal has at last reached a point where it begins to recoup the loss of over 80,000 tons from January 1 which existed a week ago, as compared with the corresponding period of last year. Although the Clearfield trade has not as yet figured in important contracts in this or Eastern markets, yet a very large production is being kept up; for the fourth week in March reaching 35,062 tons, the largest week's output ever made by that region, and following with 12,467 tons for the last three days of the month. The increase from this region from January 1 to March 31, as compared with the like period of 1876, was 77,078 tons, or 30 per cent. The total production of the region to March 31 was 329,392 net tons, as against 154,444 gross tons in the Cumberland region for the same period. This large business in Clearfield coal has been greatly assisted by the labor and other troubles in the Cumberland region, but it is mostly due to increased consumption by rolling mills and other manufacturing establishments on the line of the Pennsylvania Railroad. The trade in this coal in this and the Eastern markets is being very much interfered with now, by the low prices of Cumberland coal. It is not likely, however, that the Pennsylvania Railroad Company will permit the trade that has been secured during the past two years to entirely slip from its grasp. This trade is the safety valve that permits the payment of low wages at the mines, and high rates of freight for local shipments; and even though the coal be carried at actual cost now, it provides a large and profitable incidental business, and, when more prosperous times shall be reached, will again become a source of considerable profit to the Company. It is even now indicated that an early reduction in freight on coal to be shipped from Amboy, sufficient to enable this coal to compete with Cumberland, will be made. We are reported contracts with the American line of steam ships running from Philadelphia, for 15,000 tons of "Sterling" Clearfield coal; about an equal quantity of "Eureka" Clearfield coal to the Red Star line for steamers to coal in this city and Philadelphia; and 20,000 tons of Cumberland coal to the Boston and Lowell Railroad Company at less than $3 per ton f.o.b. at Baltimore. The latter sale has been the cause of considerable comment in the trade, as it indicates quite clearly that the Baltimore and Ohio Railroad Company is making another secret drawback. The Chesapeake and Ohio Canal Company reduced its freights on the 10th inst. 8c. per ton.

The Cumberland *Alleganian* says: "The coal contract of the Baltimore and Ohio Railroad has been awarded to four different companies. The Hampshire & Baltimore, the Keystone, the Elk Liek, and the Consolidation coal companies. The second in the above list has contracted to supply the rolling mill."

Messrs. Robert C. Adams & Co., of Montreal, under date of the 10th inst., say: "The Grand Trunk Railway awarded their coal contracts yesterday, and the following are approximately the results: At International Bridge, Buffalo Coal Company supply 30,000 tons at $3 07, U. S. currency; 'Dogoscohontas,' 15,000 tons at $3 12; Reynoldsville, 15,000 tons at $3 12. Cleveland supplies Toronto with about 26,000 tons at under $2 70, gold; Brockville with 30,000 tons at $3 90, gold, in yard. Straitsville supplies 7,000 tons at Detroit Junction, at $3 00, U. S. currency; Blossburg delivers 10,000 at Belleville, at $4 05, gold. At Montreal, Albion Mine, Pictou, delivers 7,000 tons, at about $3 95, and International Mine 7,000 tons at same figure. At Portland, Nova Scotia Mine, Pictou, delivers 10,000 tons. Cumberland was offered there as low as $4 55, U. S. currency, but the Pictou coal came in lower, even with the 75 cents duty. About 10,000 tons Scotch coal came to Montreal at 17/ c. f. i. The prices last year were considered extremely low and hardly likely to be repeated, but these figures represent an average reduction of 30 cents a ton on the whole supply. The decisions have a depressing effect on our coal market, but quotations are the same as last advised. Gas Company has bought 5,000 tons Caledonia coal and 5,000 Little Glace Bay at $1 50 f. o. b.

Gas Coals.—The latter part of last week the first contracts for gas coal were made, at $5.50 per ton, delivered in this city, thus establishing the prices of $5 per ton f.o.b. at Amboy, and $4.70 at Philadelphia. As the contracts so far have been quite unimportant, the trade has not yet determined whether these prices are to be the established ones for the season, or whether we may not yet have lower quotations.

We note the fact of sales of Provincial gas coals at Baltimore, it is said at quite low prices.

Wholesale Prices of Bituminous Coal.

Foreign Gas Coals.

	Sterling.	Am. cur'cy,
Newcastle, at Newcastle-on-Tyne	8/6@10/6	5 50@ 6 00
Liverpool House Orrel, at Liverpool	25/	13 00
Ince Hall Cannel "	35/6	18 06
" Gas Cannel "	25/6	10@10 50
Scotch Gas Cannel, at Glasgow, nominal,	25/ Gold.	7 50
Block House, at Cow Bay, N. S.	1 75	4 75
Caledonia, at Port Caledonia	1 50	4 25
Glace Bay, at Glace Bay	1 50	4 25
Lingan, at Lingan Bay	1 75	....
Sydney, International and Reserve mines at Sydney	....	....
Pictou, Albion and Vale mines, at Pictou	....	....

Retail Prices in New York.

Anthracite.

Per 2000 lbs.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$3 90	$4 20	$3 90
Lackawanna coal, in yard	3 50	4 00	3 90
Wilkes-Barre, delivered	5 00	5 30	4 60
Lehigh and Locust Mountain, del'd	5 50	5 50	5 00
Schuylkill Red Ash, del'd	5 25	5 50	4 75

The Cost of delivery for Pittston and Lackawanna coal ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb	$18 00
Liverpool House Cannel " " "	18 00
American " " "	11 00
Cannelton Block, or splint, " " "	10 00
American Orrel " " "	11@14
Red Bank Cannel " " "	10 00
Cumberland " " "	7 00

New York and Philadelphia.

Wholesale Prices of Anthracite Coal f. o. b. at the Tide Water Shipping Ports per ton of 2240lb.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
‡Lackawanna and Scranton at Hoboken and Rondout	2 90	2 90	2 90	2 95	3 35	3 25
Wilkesbarre at Port Johnston	2 90	2 90	2 90	2 95	3 35	3 00
Plymouth, R. A.	....	....	2 90	2 95	3 45	3 10
Susque: Coal Co., (S. H. Brown & Co.) At Amboy	2 75	2 75	2 75	2 80	3 25	2 85
Kingston at Hoboken	2 90	2 90	2 90	3 00	3 30	3 15
Pittston at Newburgh:						
A. S. Swords	2 80	2 80	2 85	2 85	3 30	3 25
Penn. Coal Co	3 10	3 10	3 10	3 20	3 60	3 25
Wyoming at Perth Amboy	....	3 00	3 00	3 10	3 65	3 35
Lehigh Coals.						
Old Company at port Johnston	3 75	....	3 25	3 25	3 65	3 25
Old Company's Room Run "	3 75	....	3 25	3 25	3 65	3 25
Sugar Loaf, Hobok. & Amb."	3 75	....	3 25	3 25	3 65	3 35
Lehigh at Perth Amboy	3 75	....	3 25	3 25	3 65	3 35
Honey Brook Lehigh	3 75	....	3 25	3 25	3 65	3 25
Beaver Meadow at South Amboy	3 75	....	3 25	3 25	3 65	3 25
Mount Pleasant at Hoboken	3 75	....	3 15	3 15	3 50	3 30
Cross Creek at Elizabethport	3 75	....	3 25	3 25	3 75	3 25
Schuylkill Coals at Port Richmond, Philadelphia.						
Schuylkill white ash	2 75	2 75	2 75	2 65	3 00	2 75
Schuylkill red ash	....	....	....	2 85	3 10	2 75
Lorberry	....	....	3 50	3 50	3 50	3 00
Lykens Valley	....	....	3 75	3 75	3 75	3 00

‡Boats towed by the D. & H. Co. at its expense to and from New York Harbor.

Per ton.

Freight from Hoboken and Weehawken to New York.35c.
" " Elizabethport & Port Johnston to N. Y.35c.
" " South Amboy to New York.....35c.

Freight by the boats of the companies from Hoboken, Rondout, Port Johnston, Weehawken, South Amboy and Perth Amboy to New York City and vicinity 50c.

Pittston coal at New York delivered by Penn. Coal Co.'s boats 60c. per ton additional.

Lackawanna coal delivered to carts in New York or Brooklyn, 50 cents per ton additional.

Baltimore. April 7, 1877.

Hard White Ash, Reading, Susq. Coal Co.'s, Cameron and other White Ash, Shamokin, Bear Valley, &c.

Wholesale Prices.

AFLOAT BY CARGO.

Lump and Steamboat	$3 40	Stove	$3 90
Broken	3 25	Chestnut	3 40
Egg	3 30		

In cars in dealers' yards or on switch, 15c. per ton additional.

Lykens Valley Red Ash, afloat.

Broken	$3 98	Broken	$4 15
Egg	4 13	Egg	4 30
Stove	4 13	Stove	4 30
Chestnut	3 63	Chestnut	3 80

From wharf or yard to the trade, 75c. per ton additional.

Bituminous.

George's Creek, f. o. b. at Locust Point	$3 50 to $3 60		
Clearfield, "	Canton	3 30 to	3 40

Buffalo. April 9, 1877.

Specially reported by LEE & LOOMIS.

	Lump.	Run of Mine.	Nut.	Slack.
Connellsville Coke	$5 00	....	.....	....
Brookfield Coal	4 15	....	.....	....
Briar Hill	4 00	....	2 85	....
Youghiogeny	4 00	3 15	.....	....
Monterey } Catfish }	3 50	....	....	2 40
Stoneboro	....	....	2 75	2 40
Sterling Cannel	5 00	broken 4 75	4 50 nut & slack	....
Reynoldsville	3 50	3 15	2 65	2 40
Cameron	....	3 15	.....	2 40

In New York city funds.

Boston. April 7, 1877.

Coal is nominally a little firmer. Freights are about the same, quoting $1 50@1 60 from Philadelphia, the same from Baltimore, Alexandria and Georgetown, and $1 10@1 20 from New York.

Anthracite, broken	4 50@4 75	Cannel, English	16 00
do egg	4 50@4 75	do Buckeye	10 00
do stove	5 00@5 25	Lingan	4 75@5 00
Cumberland	5 75	Pictou	5 50
Clearfield	5 25	Penn	6 25
Westmoreland	5 50	Youghiogheny	5 00@6 00
Caledonia	4 50@4 75		

—*Commercial Bulletin.*

Chicago, Ill. April 9, 1877.

Specially reported by Messrs. RENO & LITTLE.

The Vessel-Owners' Towing Company let the contract uo the 10th inst. for their coal for the season. The successful bidders were Taylor & Thomas, of Chicago, at $4 74 per ton, screened and delivered aboard, at Van Buren street, week day, at night, or on Sunday or Sun-

day night. It is Erie Briar Hill. The company, during the season, will use about 5,000 tons. The Union Tug Association, it is expected, will let its contract within a short time.

Lackawanna Stove	$8 00	Erie and Brier Hill	$6 00
" Chestnut	8 00	Wilmington and Ill	3 50@4 25
" Grate and Egg	7 50	Blossburgh	7 00

Cincinnati, O.

April 10, 1877.

Specially reported by the Consolidated Coal and Mining Co.

We have to report a firm market for bituminous coal of all kinds. Strikes among the miners have existed at intervals throughout the Monongahela, Ohio River and Kanawha coal regions. The river has offered unusual facilities for shipping in barges through the entire spring, but the destruction of barges by the great ice break-up in January, and the disorders among the miners, have prevented stocks from accumulating. There will be little or no change in anthracite prices till after the 1st of May.

	AFLOAT. Per bush.	AFLOAT. Per ton 2,000 lb.	DELIVERED. Per bush.	DELIVERED. Per ton 2 000 lb.
Youghiogheny lump	7c.	$1 94	10c.	....
" nut	5½c.	1 53	9c.	....
" slack	4½c.	1 25	8c.	....
Camden, W. Va	5½c.	1 53	9c.	....
Peytona Cannel	16c.	4 57	20c.	....
Connellsville coke	7c.	3 60	10c.	....
Youghiogheny coke	5c.	2 64	8c.	....
Crushed coke	....	....	10c.	....
Anthracite, Wilkes-Barre or Lehigh by car load				$6 70
" " " delivered				8 00

April 9, 1877.

Specially reported by Messrs. A. Buchanan & Co.

The following are quotations for the Cincinnati coal market to-day: Pittsburg coal, afloat, 6 to 7c. per bus.; Kanawha, 6c.; Ohio River coals, 5c.; Peytona Cannel at 15c. Delivered: Pittsburg coal, 10c.; Kanawha, 10c.; Ohio River coals, 8c.; Cannel, 18c; Coke, 9c.; Crushed coke, 10c.; Anthracite coal, $8 00@8 75 per ton.

Cleveland, O.

Specially reported by Messrs. Lambie & Bates.

Per ton of 2000 lbs. f. o. b. vessels.

WHOLESALE.	1 to 10 tons.	10 tons upw'd.
Brier Hill lump	$4 25	$4 00
" " nut	3 75	3 50
Massillon and Mineral Ridge lump	4 00	3 75
" " " " nut	3 75	3 50
Straitsville Lower Vein, Hocking & Shawnee, l'p.	3 60	3 35
" " " " nut	3 40	3 15
Del Carbo lump	3 75	3 50
" " nut	3 50	3 25
Rich Hill lump	3 50	3 35
" " nut	3 25	3 00
Columbiana, lump	3 25	3 00
" nut	2 75	2 50
Lacka'a., Wilkesbarre and Pittston egg and grate,	7 00	6 75
" " " stove	7 50	7 25
" " " chestnut	7 00	7 25

Lehigh $1 25 per ton higher.
All sales to be strictly cash with order or C. O. D.

Hamilton, Ont.

March 29, 1877.

Specially reported by V. Barnard.

Prices as quoted below give the present state of our market for coals that are in demand:

Grate	$5 95	Briar Hill screened	6 00
Egg	5 75	" " unscreened	5 50
Stove	6 50	Blossburgh	6 00
Nut	6 50		

Indianapolis, Ind.

April 7, 1877.

Specially reported by Messrs. Cobb & Branham.
Wholesale on board cars, and retail delivered to consumers.

BITUMINOUS.			
White River, per ton	$ 2 50	Peytona Cannel, per ton	$ 5 75
Brazil Block, "	2 25	Indiana Cannel	4 50
Highland, grate, "	2 00	Hocking Valley	4 25
Block coal, nut, per car.	18 00	Youghiogheny	4 50
Highland "	18 00	Blossburg (smithing)	6 50
Block Slack "	17 00	Piedmont "	6 50
		Gas Cake, per bushel	10
ANTHRACITE (Lackawanna and Wilkes-Barre).			
Broken	$7 60	Nut	$6 70
Egg	7 60	Stove	6 70
Lehigh Anthracite.			
Broken	$7 60	Nut	$7 30
Egg	7 60	Stove	7 70
Retail, per bushel, delivered.			
Sand Creek	13c.	Block Nut, steam	8c.
White River	13	" Slack, "	0
Brazil Block	13	Virginia Cannel	27
Highland Grate	11	Youghiogheny	16
Block Nut, domestic use.	11	Blossburg	26
Highland Nut, " "	11	Piedmont	26
" " steam	8		
GAS COKE (measured.)			
Crushed	14c.	Lump	12c.
ANTHRACITE.			
Wilkes-Barre and Lackawanna (all sizes)			$7 50 per ton.
Lehigh, retail			8 50 per ton.

Louisville, Ky.

April 9, 1877.

Specially reported by Messrs. Byrnes & Speed.

WHOLESALE.			
Pittsburg	7c. per bush.	Pine Hill	9c. per bush.
Raymond City	7c. "	Kentucky	8½c. "
RETAIL.			
Pittsburg	12c. per bush.	Pine Hill	11c. per bush.
Raymond City	11c. "	Kentucky	10c. "
Indiana Cannel	17c. "	Honeywell Can'l	19c. "
City Make Coke	10c. "	Anthracite	$8 50 to $9 per ton.

Milwaukee, Wis.

April 9, 1877.

Specially reported by Messrs. R. P. Elmore & Co.

Retail price per ton of 2,000 lb.

Lehigh Lump	$8 00	Briar Hill, select	$7 00
Lehigh Prepared	9 00	Blossburgh	7 00
Lackawanna (all sizes)	8 00	Cannel	6 00
Pittston	8 00	Pittsburgh	6 50
Scranton	8 00	Oak Hill	4 00
		Steam coal	6 00

Montreal.

April 10, 1877.

Specially reported by Messrs. Robert C. Adams & Co.
Wholesale per ton of 2,240 lb.

Scotch Steam	$4 50	Cape Breton Steam	$3 75
Pictou	4 25	Newcastle Smiths	6 50
Anthracite at retail, per 2,000 lb, delivered.			
Egg	$6 50	Chestnut	$7 00
Stove	7 00		

Philadelphia, Pa.

April 12, 1877.

Specially reported.

The trade is moderately active here, and a good many orders are booked for shipment, but mostly at limited rates of freight, which are impracticable as long as vessels remain so scarce; $1.55 to $1.60 is now freely offered to Boston. The dealers here are storing coal at prices which they think are very low, and which are certainly below the average cost of production. Some believe in the attempt being made, on June 1st, to raise prices 50c., and some do not: time will show. There is no doubt that all the producers are anxious for something to be done to extricate them from the present condition of things, but what is that something to be which will benefit them, be carried out faithfully and be accepted by purchasers as a safe basis to buy coal? That is the question. There is n doubt that in the meantime those who purchase now are acting wisely.

Pittston, Pa.

Apr. 12, 1877.

Pennsylvania Coal Company's Coal in yard, ton of 2000 lb.
Retail.

Lump, Egg and Stove	$2 25
Chestnut	2 00
Pea	1 00

Delivered, fifty cents per ton additional

Richmond, Va.

April 12, 1877.

Specially reported by S. H. Hawes, Dealer in Coal.
Per ton of 2,240 lb., f. o. b.

Kanawha Cannel	$9 00	New River Bituminous	$4 25
Coalburg Splint	5 70	Clover Hill Coal	3 50
Lewiston "	5 70	James River Bitum	3 25
Kanawha Gas Coal	4 90	" " Carbonite	5 00

Sandusky, O.

April 10, 1877.

Specially reported by C. E. Black, Agt. Con. Coal & Mg. Co.

The retail prices for this market for present delivery are:—

Per ton of 2,000 lbs.

Anthracite.			
Chestnut and Stove	$7 00	Furnace	$6 75
Bituminous.			
Massillon	$3 75	Shawnee	$3 00
Del Calbo	3 50	Blossburg	6 00
Hocking Valley	3 50		

St. Louis, Mo.

April 9, 1877.

Reported by Jas. J. Sylvester, Secretary of the Anthracite Coal Association.
Retail prices, delivered. Ton of 2,000 lb.

ANTHRACITE.	per ton.		per ton.
Lackawanna	$9 00@10 00	Schuykill	9 00@10 00
Wilkes-Barre	9 00@10 00	Lehigh	10 00@10 50
BITUMINOUS.			
Blossburg	9 00	Big Muddy	3 00
Pittsburg	4 50	Illinois Coals	2 50@3 00
Indiana Block	4 00	Connellsville Coke	6 50

San Francisco, Cal.

From the *Commercial Herald* April 5, 1877.

Coal—Imports from January 1st to April 1st:

	Tons.		Tons.
Anthracite	5,406	Mt. Diablo, 2 mos.	10,051
Australian	10,590	Vancouver Island	22,128
Coos Bay	9.354	Rocky Mountain	43
Cumberland	4,222	Seattle	29,620
English	17,623	Bellingham Bay	1,850

The Seattle mines of Washington Territory continue to send us large supplies of their superior product, while the colliers of the Wellington mines, British Columbia, are at variance with the owners, compelling work to cease for the present. The Nanaimo mines are, however, producing freely, supplying the Pacific Mail Company liberally. The Seattle Company have yet a running contract with the Pacific Railroad. Bellingham Bay, Coos Bay, Black Diamond, and Mt. Diablo coals arrive freely, all selling at low prices from the wharf, say for cargo lots $7 75@8 00. Vancouver Island coals, $8 00@9 00 by the cargo; Scotch and English Steam, $7 50@8 00; Australian cargoes to arrive, $9 00@9 25. Considerable excitement prevails in Santa Rosa in regard to the newly discovered coal mine about three miles from that place. The mine as opened shows a seam of coal nine feet in width, and of superior quality, being free from sulphur, and especially adapted for blacksmiths' use and other interests requiring considerable heat. It is also a fine burning coal for household purposes, not unlike English Cannel. It is very cleanly, and does not soil the hands by handling it.

Toledo, Ohio.

April 10, 1877.

Specially reported by Messrs. Gosline & Barbour.

We quote coal as follows on cars at Toledo for rail shipment:

Ton of 2,000 lb.

Straitsville lump	$2 75	Hocking Valley nut	2 35
" nut	2 35	Massillon lump	3 00
Shawnee lump	2 75	Cumberland	5 50
" nut	2 35	Blossburg	5 50
Hocking Valley lump	2 75		

	Grate.	Egg.	Stove.	Chestnut.
Pittston	$6 00	$6 10	$6 60	$6 35
Wilkes-Barre	6 00	6 10	6 60	6 35
Lackawanna	6.00	6 10	6 60	6 35
Lehigh	6 75	6 85	7 35	7 10

For retail delivery, from 50c to $1 per ton in addition to above prices is charged.

Prices soft coal f. o. b. vessel for Lake shipments will be from 15 to 20c. per ton more than prices on cars.

Freights

Representing the latest actual charters up to April 12.
Per ton of 2240 lb.

Ports.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me.	....	....	....	....
Albany	...	1 75	....	....
Alexandria	80	....	....	....
Annapolis, Md.	65@70	....	....	....
Bangor, Me.	....	....	....	....
Bath, Me.	...	1 50	....	1.15-1.25
Baltimore	60@65	....	....	....
Boston, Mass.	150@160	1 50	160@170	1.20-1.25
Bridgeport, Ct.	....	1 40	1 40	50
Bristol, R. I.	....	....	....	80
Beverly, Mass.	1 50	....	....	....
Cambridgeport, Mass.	1 50	....	....	....
Charleston, S. C.	1 50	....	....	....
Danversport, Mass.	1 50	....	....	....
Fall River	1 25	1 40	1 45	80
Gloucester	....	....	....	....
Greenport, N. Y.	1 30	....	....	....
Hartford, Conn.	....	2 00	....	....
Hoboken	80@90	....	1 25	35
Hudson	....	1 60	....	....
Jersey City	....	....	1 25	35
Lynn, Mass.	....	....	....	1 30†
Middletown	....	....	....	90
Marblehead, Mass.	1 52½	....	....	....
Newark	....	....	....	....
New Bedford	1 25	1 45	1 50	85
Newburyport	....	1 75	....	1 40
New Haven	....	1 40	1 40	50
New London	1 25	1 40	1 45	65@70
Newport	....	....	....	80
New York	65	1 25	....	35
Norfolk	80@107	....	....	75
Norwalk	....	1 75	....	50
Norwich	1 30	1 40	....	....
Pawtucket	....	1 60	....	90
Philadelphia	....	80	....	....
Portland	130@160	1 50	....	1 25
Portsmouth, N. H.	150@170	1 60	....	1 40
Providence	125@130	1 40	1 45	80
Poughkeepsie, N. Y.	....	....	....	....
Richmond, Va	65@70	....	....	....
Rockport, Mass	....	....	....	....
Salem, Mass.	....	1 50	....	....
Somerset, Mass.	1 30	....	....	....
Stamford	....	....	....	60
Stonington	....	....	....	75
St. Johns, N. B.	....	....	....	....
Troy	....	....	....	....
Taunton	....	....	....	....
West Chester, N. Y.	....	....	....	....
Washington	75@85	....	....	....
Weymouth	....	....	....	....
Wilmington, Del.	....	80	....	....
Wareham	....	....	....	....
Yonkers, N. Y.	....	....	....	....

* And discharging and towing. † And discharging. ‡ And towing. § 3c. per bridge extra.

Rates of Transportation on Anthracite Coal to Tide Ports.

Lehigh and Wyoming Coals. per ton of 2240 lb.	From Penn Haven.	From Mauch Chunk.	From Hazleton**	From Upper Lehigh.	From Ashley and Sugar Notch.
To † Newark, N. J. (117 miles) via Central Railroad of New Jersey	1 36	1 22	1 80	1 71	1 92
† Mauch Chunk, Pa., via Central Railroad of N. J.	14	...	58	49	70
† Phillipsburg, N. J., (146 miles)	70	56	1 14	1 05	1 26
Elizabethp't, (114 m.) Pt. Johns., Hoboken & South Amboy, N. J., shipping and wharfage 15c. add.	1 00	86	1 44	1 35	1 56
High Bridge, N. J.	1 80	1 60	2 58	2 19	2 30
Elizabeth, Cranford, Westfield & Elizabethport, for consumption.	1 80	1 60	2 18	2 19	2 30
Jersey City, N. J., (121 miles) and New York, via L. V. RR.	1 59	1 22	2 01	1 92	2 15

From *Mauch Chunk* to *New York* (121 miles), (towing limits, and Jersey City‡ via Lehigh Valley RR. $1 12

From *Mauch Chunk* to *Philadelphia* (93 m) via L. V. and L. and S. RR. and North Penn. RR. 1 25

From *Mauch Chunk* to *Philadelphia* (92 m) via L. V. and Perkiomen RR. 1 40

For way points between *Mauch Chunk* and *Phillipsburg* on the New Jersey Railroads. 1 00

From *Phillipsburg, N. J.*, to *Hoboken* (84 m) for shipment via Delaware, Lackawanna & Western RR., Morris and Essex Division 65

From *Phillipsburg, N. J.*, to *Newark* (75 m) via Delaware, Lackawanna & Western RR. 66

** Rates on line coal from Hazleton are 10c. per ton above these figures.

† The cost of unloading is to be added to these rates. No charge less than 40c. per ton will be made for any distance. Tolls from Mauch Chunk to Phillipsburg for way points will be $1 00 per ton.

‡ On coal received by canal at Jersey City, a charge additional to the freight, of twenty cents per ton, will be made for transferring it from boat to boat, and thirty cents per ton for placing the same on the wharves and reshipping.

The distances in the above table are computed from *Mauch Chunk*. From *Ashley* to *Mauch Chunk* the distance is 51 miles, and from *Upper Lehigh*, 33 miles. From *Hazleton* 24 miles, and from *Penn Haven* 8 miles.

From *Wilkes-Barre* to *Perth Amboy* via the Lehigh Valley Railroad Company, the distance is 161 miles, and from *Mauch Chunk* it amounts to 106 miles.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, April 13, 1877.

American Pig.—The possibilities of war in Europe, with England involved, and its bearing upon the iron trade of this country, is being discussed. In the event of such, there is no doubt that the general business of the country would receive some impulse, but the consumption of iron would be among the last to feel its effect. Should Great Britain become involved she would lose some important markets, and Scotch iron would probably seek a market in this country at such low figures as to prevent any material advance in our prices. Our market continues very quiet and quite demoralized, with some parties showing considerable anxiety to realize.

Our Western and Southern letters mostly indicate an improving state of affairs in those districts. We note sales of 800 tons of the Thomas Co.'s iron, 1,250 tons of Jaggers iron, mixed brands, and 1,000 tons of Allentown, the two latter lots on private terms. We quote No. 1 foundry at $19@$20; No. 2 foundry, $18@$19; and forge, $17@$18.

Scotch Pig.—The business in this article continues to be confined to small lots at barely steady prices. We quote Eglinton at $24.50; Coltness, $26.25; and Glengarnock, $25@$26.

Messrs. John E. Swan & Bros., of Glasgow, under date of March 29, say there were 104 furnaces in blast, as compared with 118 at the same date in 1876; 129,107 tons of pig iron in Connal & Co's. stores, as against 62,484 tons a year previous, and that the shipments for the week ending March 25 were 9,312 tons, as against 8,984 tons for the corresponding week of last year. The total shipments from December 25, were 83,284 tons, as compared with 87,657 tons for the like period of 1875-6, showing a loss this year of 4,373 tons. Quotations were as follows for No. 1 iron: Gartsherrie, 61/; Coltness, 64/ 6d.; Summerlee, 60/; Langloan, 62/; Glengarnock, 59/; and Eglinton 55/ 6d. Rates of vessel freights were as follows: To New York, 2/; Boston, 9/; New Orleans, 5/; Baltimore, 8/; Philadelphia 7/ 6d.; Montreal, 10/; and San Francisco, 25/.

Rails.—We are reported no sales and quote iron rails at mills at $33@$37; and steel, $47@$50.

Old Rails.—We only note a sale of 500 tons on private terms, and continue to quote at $19.

Scrap.—In the absence of business we quote nominally $26 for No. 1 wrought.

Baltimore, Md. April 11, 1877.

Specially reported by Messrs. R. C. HOFFMAN & Co.

Our iron market shows no improvement. The trade is very dull in all its branches, and transactions light. We quote present prices as follows:

Baltimore Charcoal	$29@31	Mottled and White	$16@17 00
Virginia Charcoal	28@32	Charcoal C. B. Blooms	60@62 00
Anthracite No. 1	21@22	" " Billitts.	65@67 00
" " 2	20@21	Refined Blooms	45@50 00
Anthracite No. 3	19@20		

Boston. April 7, 1877.

PIG is dull and depressed. We quote $23 50@25 for No. 1, $23 for No. 2, and $22@23 for gray forge. Scotch pig is dull. We quote Coltness $28, Glengarnock $26 60, and Eglinton $26. Bar is dull, quoting $47@48 for refined, and $38@39 for common. Nails are in light demand. Rails have quieted down.—*Commercial Bulletin.*

Chattanooga, Tenn. April 10, 1877.

Specially reported by J. F. JAMES, dealer in pig iron, ores, etc.

There is very little to note in the condition of our market since last report. Demand from the Southern foundries is still on the increase, indicating an improvement of business in general throughout the South. Prices remain unchanged.

Tenn., Ala. and Ga. Charcoal, No. 1 Foundry	$20 00@22 00		
Tenn., Ala. and Ga. Charcoal, No. 2 Foundry	19 00@20 00		
Tenn , Ala and Ga. Charcoal, Gray Forge F'dry.	16 00@17 00		
Tenn., Ala. and Ga. Coke, No. 1 Foundry	20 00@21 00		
Tenn., Ala. and Ga. Coke, No. 2 Foundry	18 00@19 00		
Tenn., Ala. and Ga. Coke, Gray Forge Foundry	16 00@17 00		
Charcoal or Coke, white and mottled	15 00		
Tenn., Ala. and Ga. Cold Blast (car wheel)	22 00@28 00		
Old rails	18 00@19 00	Wrought scrap,	
Old car wheels	16 00@17 00	No. 2	12 00
Wrought scrap, No. 1	17 00	Cast scrap	10 00
		Muck bar	32 00@33 00

Iron Ores.

Red Hematite (about 55 per cent. metallic iron) f. o. c. at mines	1 25
Brown Hematite (about 55 per cent. metallic iron)	1 75

Cincinnati, O. April 10, 1877.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

Our market remains about the same. The demand is fair, and stocks of good brands of charcoal irons are scarce. We quote:

CHARCOAL.

Hanging Rock No. 1 Foundry	$25 00@		—4 mos
" " 2 "	24 00@		—4 mos
" Soft Silver Gray	22 00@23	00	—4 mos
" Mill	21 00@22	00	—4 mos
Tennessee, No. 1 Foundry	23 50@24	00	—4 mos
" " 2 "	22 50@23	00	—4 mos
" Mill,	21 00@22	00	—4 mos

STONE COAL.

Ohio, No. 1 Foundry	22 50@23	00	—4 mos
" " 2 "	21 50@22	00	—4 mos
" Soft Silver Gray	21 00@21	50	—4 mos
" Mill	20 50@21	00	—4 mos

COKE.

Ohio & W. Va. No. 1 Foundry	25 00@		—4 mos
" " " 2 "	24 00@		—4 mos
" " Mill	21 00@22	00	—4 mos

CAR-WHEEL.

Hanging Rock, C. B.	38 00@43	00	—4 mos
Tennessee, "	28 00@32	00	—4 mos
Missouri, "	30 00@33	00	—4 mos
Alabama, "	28 00@32	00	—4 mos

BLOOMS.

Charcoal	50 00@60	00	—cash.

SCRAP IRON.

Cast	50c.@	1 00	"
Wrought	1 00@	1 40	"

Cleveland, O. April 11, 1877.

Specially reported by Messrs. C. E. BINGHAM & Co.

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, L. S. Charcoal	$26 00	Am. S., No. 1, Ch. Val.	24 00
No. 2, " " "	25 00	" " B—1, " "	23 00
No. 1, Anthracite	24 00	" " No. 2, " "	22 00
No. 2, "	23 00	No. 1, Massillon	24 00
No. 1, Bituminous	24 00	B—1, "	23 00
No. 2, "	22 00	No. 2, "	22 00

CAR WHEEL AND MALLEABLE IRON.

No. 3, L. S. Charcoal	26 00	No. 5 & 6, L. S. Charcoal	$27 00
No. 4, " " "	27 00		

BESSEMER IRON.

Nos. 1 & 2, L. S. Char.	$26 00		

FORGE IRON.

No. 1, Gray	$21 00	White and Mottled	$19 00

Louisville, Ky. April 10, 1877.

Specially reported by Messrs. GEORGE H. HULL & Co.

The market is quiet and without change in either price or tone. The receipts continue small, but are fully equal to the demand. The usual time, four months, is allowed on the quotations below.

FOUNDRY IRONS.

No. 1 Hanging Rock, Charcoal	$24 50@25	50	
No. 2 " " "	22 00@23	00	
No. 1 Southern Charcoal	21 50@22	00	
No. 2 "	20 50@21	00	
No. 1 Hanging Rock, Stonecoal and Coke	23 00@24	00	
No. 2 " " " " "	21 00@22	00	
No. 1 Southern Stonecoal and Coke	21 00@21	50	
No. 2 " " " "	20 50@21	00	
"American Scotch"	23 00@23	50	
Silver Gray	19 00@21	00	

MILL IRONS.

No. 1 Charcoal, Cold-short and Neutral	20 00@21	00	
No. 1 Stonecoal and Coke, Cold-short and Neutral	20 00@20	50	
No. 2 " " " " "	19 00@19	50	
No. 1 Missouri and Indiana Red-short	24 00@24	50	
White and Mottled, Cold-short and Neutral	16 00@17	00	

CAR-WHEEL AND MALLEABLE IRON.

Hanging Rock, and Cold Blast	37 00@40	00	
Alabama and Georgia "	28 00@35	00	
Kentucky Cold-blast	28 00@40	00	

Milwaukee, Wis. March 30, 1877.

Specially reported by Messrs. R. P. ELMORE & Co.

There is no change in the price of coal or pig iron. Should there be any change we will notify you of such. There is no possibility of there being such before the opening of navigation.

L. S. No. 1 Charcoal	$26 00	L. S. No 1 Anthracite	$25 00
" " " 2 "	2 500	" " " 2 "	24 00

Montreal. April 3, 1877.

Pig iron—Gartsherrie, $22 00 to 22 50; Summerlee and Calder, $21 00 to 21 50; Eglinton and Clyde, $19 50 to 20 00; Hematite, $26 00 to 27 90. Bars—Scotch and Staffordshire, $2 00 to 2 10; best do., $2 20 to 2 30; Swedes and Norway, $4 75 to 5 50; Lowmoor and Bowling, $6 00 to 6 50.—*Monetary Times.*

Philadelphia, Pa.

[Weekly Report of the Philadelphia Iron Market, furnished for THE ENGINEERING AND MINING JOURNAL, by JUSTICE COX, Jr., & Co., Iron Manufacturers, 333 Walnut Street, Philadelphia. Week ending April 12, 1877].

PIG IRON.—The demand for pig iron is light, and most companies quote a weak market, whilst some hold firm to price and keep well sold up. We report sales of 2,500 tons Chickies at $18, $19 and $20, at furnace for No. 1, 2 and 3; also about 1,000 tons No. 2X; a lighter brand at $18, with about 3,000 tons different brands at quotation. We quote No. 1, $20 to $20 50; No. 2, $17 50 to $18 50. Gray forge $17 to $20, as to brand.

MANUFACTURED IRON.—The inquiry for all kinds of manufactured iron this week has been quieter than for some months; if it should result in business, the mills in this neighborhood will have as much, if not more, than they can do. The trade is generally dull, with a weak feeling as to rice. We quote bars 2 to 2 2-10c. per lb. as to brand. Tank 2⅝ to 7c. per lb. as to quality. Skelp 2¼ to 2½c. per lb.

STEEL RAILS.—We hear nothing new as to order or the combination talked of. We quote $49 to $50 at mill.

IRON RAILS.—There is a little more demand, but prices are so wonderfully low and so little money to pass, that few transactions are reported. We quote $36 to $40.

OLD RAILS.—We hear of few sales, and quote $20 to $21.

SCRAP is dull of sale. We quote wrought $24 to $26; cast $14 to $19.

Pittsburgh, Pa. April 10, 1877.

Specially reported by A. H. CHILDS.

The metal market is without any decided change. Red short iron continues in demand at full rates, while most brands of cold short irons, or neutral irons with cold short tendency, are offered freely, with prices hardly so firm as heretofore. The recent reduction to 1¾ rate for bar iron, following as it did the decline in price of nails, has exerted a depressing influence on the market generally. Quotations are nominally as last reported.

	4 mos.		4 mos.
No. 1 F'dry	$23 00@24	White and Mottled	$18 00@19
" 2 "	22 00@23	Cold blast Charcoal	
Gray Forge	20 00@22	Western	40 00@45

Richmond, Va. April 7, 1877.

Specially reported by ASA SNYDER, Esq.

Charcoal pig iron is at a complete standstill. There has been no retrocession in prices because the market is so nearly bare that the stock can be disposed of in a small way at existing quotations.

Virginia Cold Blast Charcoal Pig Iron					$27 to $33
" Warm " " "					24 to 28
" " " Coke	"	"	1 X		23 to 24
" " " "	"	"	2 X		21 to 22
" " " "	"	"	3		20 to 21
" Anthracite 1 X					— to —
" " 2 X					— to —
" " 3					— to —

San Francisco, Cal.

From the *Commercial Herald* of April 5, 1877.

"There is a lessened demand for Tin Plate now that the Salmon canners are supplied. The local canners of fruits and vegetables are not yet prepared to enter the market for their summer supplies. Sydney Block Tin has been sold recently at 18@18¼c, yet we note an increased requirement for Banca Tin, even at the difference in price. Pig Iron is in light demand and prices nominal. The *Granada* carried to New York via Panama, 677,890 lb Pig Lead. The ship *Routenback* from Liverpool is to hand with 280 tons Pig Iron and 9,440 boxes Tin Plate.

St. Louis, Mo. April 10, 1877.

Specially reported by Messrs SPOONER & COLLINS, Commssion Agents for all kinds of Iron.

Since our last letter our market has become quite dull, and the demand for iron fallen off considerably. Prices remain unchanged. We look for no present change in the condition of things; at least, not till late in the season. We quote same as last:

CHARCOAL.

Missouri No. 1 Found'y.	$23@25		
" " 2 "	22@23		
" Gray Mill	22@23		
H. Rock No. 1 Found'y.	25@26		
" " " 2 "	23½@24		
" " Gray Mill	23@24		
Tenn. No. 1 Foundry	23½@24		
" " " 2 "	22½@23		
" Gray Mill	22½@23		

COKE.

Alice H. R. Ex No. 1 F'y.	26	50	
" " 2 "	25	50	
B, " 1 "	24	50	
" 2 "	23	50	
Forge .	23	50	
Chat., Tenn. No. 1 Fd'y.	25	00	
" " " 2 "	23	50	
" " Forge	22	50	
" " White Mtl'd	21	00	

STONE COAL.

Missouri No. 1 Fd'ry.	.25@24		
" " 2 "	.23@23		
" Gray Mill	22@26		
" White & Mt'd	21@22		

COLD BLAST CHARCOAL FOR CAR WHEELS.

All Numbers

Hanging Rock	35@46		
Tennessee	30@33		
Kentucky	30@33		
Missouri	28@30		
Georgia	58@30		
Alabama	28@30		
Assorted Bar Iron	$2 25, rates.		
No. 1 Wrought Scrap	95c. cwt.		
Heavy cast	70	"	
Light "	40	"	

METALS.

NEW YORK, FRIDAY EVENING, April 13, 1877.

The depression which pervades all the branches of trade which we report, is very marked in metals. A few weeks ago there were promising signs of an improvement, which apparently had actually set in, but these have all disappeared again. It is felt that a war in Europe has been largely discounted, and that no material change will occur in prices if it should be declared, at least not before the probable extent and duration of the war should be known.

Gold Coin.—During the week under review the price of gold has ranged from 104⅜ to 106⅛ and closed at 105⅞.

Bullion.—Silver is strong abroad in consequence of higher exchange on India, and that no further sale at the recent lower rates were made by the German Government. It has an appearance of steadiness at the present figures. The price in London to-day is 54¼d., in this city 118@118¼ per oz.; and in San Francisco 8 per cent. discount. Fine gold bars are quoted at ⅛ to ¼ per cent. premium.

Copper.—Manufacturers and dealers have been purchasing a little more freely for the week sales amounting to about 500,000 lbs. at 19¼@19½c., the market closing at 19⅜@19½c. Chili bars in London are quoted at £70 and Best Selected £76, a decline of £1 10/ to £2 since last Saturday.

Tin.—Straits in London is quoted at £70. There is nothing doing in this market. Quotations in gold are as follows: Straits, 16⅞c.; Refined, 16¼c.; L. & F., 16c., Banca, 18½c.

Tin Plates.—These are only in moderate demand. We quote, in gold, per box, as follows: Charcoal tins, $6.75, and ternes, $6; Coke tins, $3.87½, and ternes, $5.50.

Messrs. Robert Crooks & Co., of Liverpool, under date of March 29th, say of tin plates: "Makers are pressing hard for orders, of which, in most cases, they are badly in want. No confidence in the stability of even present prices is felt, and buying is of a strictly hand-to-mouth description."

Lead.—Sales have not been of sufficient importance during the week to determine prices. There is a

pretty general feeling that prices must weaken, considerable supplies being constantly shipped from San Francisco, while there are now about 3,000 tons *en route* to this market, and our supplies here aggregate about 2,200 tons. Our quotations range from 6⅜c. to 6¾c.

Spelter and Zinc.—Domestic spelter is exceedingly quiet at 6¼ and 6¼c. Sheet zinc, with but little selling, is quoted at 7⅜c. and 7½c. currency.

Antimony is quiet at 12⅝c. gold.

Quicksilver.—The London quotation is £7 10/ while San Francisco quotes at 41c.

The San Francisco *Commercial Herald* of April 5, says of Quicksilver: From London we note an advance in price to £7 10s. per flask. With us the price is 41c. The steamer City of Peking carried upward of 1,400 flasks to Hongkong. The Granada for Callao had 200 flasks.

Our monthly receipts of this article compare with 1876, as follows:

	1876		1877	
Month.	Bay, Flasks.	Coast, Flasks.	Bay, Flasks.	Coast, Flasks.
January	3,877	281	5,087	327
February	3,804	62	7,118	183
March	3,762	154	5,032	409
Totals	11,503	497	17,237	919

The Quicksilver exports by sea have been as follows:

	Flasks.	Values.
The past week	2,224	$ 70,746
Previously since January 1	13,456	475,590
Totals since January 1, 1877	15,680	$546,336
Totals same period, 1876	8,814	410,142
Increase this year	6,866	$136,194

Our exports by sea for March, 1876-7, were as follows:

	1876		1877	
To	Flasks.	Value.	Flasks.	Value.
China	2,410	$108,810	2,688	$89,558
Mexico	487	22,031	555	18,551
Australia	...	.....	303	12,239
South America	300	13,617	500	16,520
Japan	29	1,411	...	.....
New York	600	27,919	200	6,500
Central America	97	4,154	6	202
Totals	3,923	$178,542	4,312	$143,570

FINANCIAL.

New York Stocks.

New York, Friday Evening, April 13, 1877.

The past week has been a very excited one in our New York stock market, and nearly all securities have experienced a heavy decline. The coal stocks were large sufferers, Delaware and Hudson having declined from 49½ to 30, the lowest point yet attained, but it subsequently recovered to 4,4 closing at 42⅛.

This decline was occasioned by a false rumor, stating that application had been made by officers of the Company to place it in the hands of a receiver. When this *canard* was caught the stock recovered somewhat though not to its former position. That a general decline in the coal stocks should have followed the announcement that the Company had effected a coal combination, shows how little faith the public puts in the statement.

The failure, on the 12th, of H. Kennedy & Co. caused by the neglect on the part of its clients to put up "margins" on stocks produced, for the time, quite a panic on the street, and the general weakness of the market, and the uncertainty as to present values was painfully apparent.

There was a rather better feeling to-day, and prices recovered somewhat.

Canal, Dover, Ohio, Rolling Mill Company.—We note the recent incorporation of this Company, with a capital stock of $100,000.

Raccoon Valley, Indiana, Railway Company.—The proposed line begins at Montezuma, extending through the counties of Park, Vigo and Clay, to Brazil. The length is twenty-five miles.

Kentucky Union Railroad.—It is proposed to organize a company by this name to build a narrow-gauge railroad from Louisville, Ky., eastward through Jefferson, Shelby, Franklin, Scott, Bourbon and Montgomery counties to the coal regions, about 110 miles. The projected road is parallel to existing lines nearly the the whole distance.

Northern Pacific Railroad.—It is said that this company is making arrangements to build an extension from Bismarck, Dakota, westward about 30 miles to some coal mines.

Work is progressing steadily on the extension of the Pacific Division from Tacoma, Washington Territory, to the Puyallup coal mines.

Baltimore and Ohio Railroad Company.—At the regular monthly meeting of this company, held at Camden Station, Baltimore, on the 12th inst., the board unanimously ratified the compact in regard to freights recently made by the presidents of the trunk lines. The usual semi-annual dividend of five per centum on the stock of the main stem was declared.

Boston, Hoosac Tunnel and Western Railroad.—Application has been made to the Massachusetts legislature for the incorporation of this road. It is proposed to run it through the tunnel, forming connection with the State road running directly west, crossing the Hudson river at Mechanicsville twelve miles above Troy, and connecting with the Delaware und Hudson Canal Company's road to Schenectady, Troy, Albany, Saratoga Springs, and over the Albany and Susquehanna division to the Erie railway at Binghamton, and also to the coal fields of Scranton and the Lackawanna valley.

Delaware and Hudson Canal Company.—The decline of this stock to 36 per cent. on the 11th inst. has been the feature of the week. It has steadily advanced since then, closing at 42⅛ per cent. with sales of over 51,000 shares.

Delaware, Lackawanna and Western Railroad Company.—The extreme prices of this stock have been 59⅝ and 50, closing at 53¾, with sales aggregating over 351,000 shares.

New Jersey Central Railroad Company.—The sales of this stock have been limited to about 4,000 shares within a fraction of 8 per cent. The operatives on the Lehigh and Susquehanna division have been paid the promised 20 per cent. of back pay, the first payment in five months.

Miscellaneous Sales and Quotations.

Sales and quotations of the stocks and bonds dealt in here and at Philadelphia, for the week ending the 13th inst. are given in the following tables. The Philadelphia quotations will have a * affixed.

STOCKS.

	Quotations. Highest.	Lowest.	Closing.	Sales Shares.
American Coal Co	—	—	20	—
*Cambria Iron Co	—	—	57	—
*Pennsylvania Salt Manf'g Co.	—	—	70*	—
*Westmoreland Coal Co	—	—	—	—
*Buck Mountain Coal Co	—	—	—	—
Schuylkill Nav. Co	—	—	7⅞	100
St. Louis, I. M. & S. Rll. Co	8	5	5	550
Spring Mountain Coal Co	—	—	63*	—

BONDS.

D., L. & W. 7s, Convt., 1892	103½	—	103⅛	4,000
" " 2d mtge., 1881	106⅛	106⅛	—	3,000
N. J. C., 1st mtge., new	105⅜	104⅛	105	18,000
" " 1st mtge., cons	53½	52	52⅜	17,000
" " Convt	48	46	46¾	26,000
L. & W. B. Coal Co., cons	29	27¾	26	22,000
Am. Dock & Imp. 7s	45	—	44	2,000
D. & H. C. Co., 1st m., 1884	95⅛	—	93¾	1,000
" " " " " 1891	97	95½	95½	25,000
" " " " " 1877	98	—	98	4,000
" " " " reg. & con., 1894	98¾	88	88	3,000
St. L. I. M. & S., 1st mtge	94	—	94	10,000
Ches. & Ohio, 1st mtge	—	—	20	—
*L. V. RR., con. mtge., 6s, 1923	93⅛	—	—	38,000
" " 2d mtge., 7s, 1910	108	105⅜	—	27,000
" " reg. & con., 1898	106½	—	106½	4,000
" " 1st mtge., 6s	—	—	—	—
*P. RR., 1st mtge., 1880	—	—	104⅜	—
" Gen. mtge. reg., 1910	104	103¾	103¾	6,000
" Con. m. 6s. cou. & reg. 1905	94½	—	94½	13,000
Pa. gen. M. Coup., 1910	106¾	106	—	2,000
*P. & R. RR., 7s, 1893	—	—	—	—
" " con. m. 7s. cou. 1911	93¼	—	—	14,000
" " Deb. 6s, 1893	35	—	35	4,000
" " New convt. 7s	50	—	—	2,000
" " Con. mtge. 7s. reg.	94	93¼	—	7,000
" " 6s. 44-80	—	—	101⅛	—
*P. & R. C. & I. Co. Deb. 7s	50	—	50	5,000
*P. & R. C. & I. Co., Tamaqua T.	55	—	55	103,000
*L. C. & N. Co. 6s. 1884	101	—	—	0,200
" " RR. loan 1897	100	99⅛	99	5,600
" " Con. mtge. 7s	—	—	—	—
" " Convt. gold, 1894	—	—	—	—
" " Gold Loan, 1897	88	87	—	15,500
*Schuylkill Nav., 6s. 1897	50	—	—	500
*Pa. and N. Y. Canal, 7s	105¼	—	105¼	7,000
*Pa. Canal Co	—	—	—	—
*Susquehanna Coal Co. 6s	—	—	—	—

Total transactions for the week.....$394,800

Philadelphia Stocks.

Philadelphia, Friday Evening, April 6, 1877.

The coal shares in this market close at very nearly the lowest point of the week, and the prevailing feeling shows a gradual lack of confidence as to the future of prices. The effect of the panic in the New York market was only felt here yesterday, but appears to be disappearing to-day, as a slight recovery in all instances has taken place.

Pennsylvania Railroad Co.—About 110,000 shares of this stock have been sold during the week at 78½ to 72 per cent., closing at 74 per cent. This company is about to convert its $500,000 loan to the American Steamship Company into 5,000 shares of that company's stock, which will be additional to the present capital. At the sixth annual meeting of the Steamship Company, held a few days ago, the report showed that the receipts for freight and passengers during the year were $1,066,043.33; expenses, 792,516.05; balance, $273,527.28. The net profit after deducting expenses for store agencies, etc., was $145,000. While the total receipts were less by $10,000 than for the preceding year, the profits were considerably increased.

Lehigh Valley Railroad Company—This stock has ranged between 82 and 74½ per cent., closing at 75 per cent. The sales have been about 4,600 shares. This company has ordered a reduction of 10 per cent. on the salaries and pay of officers, conductors, baggagemasters, brakemen, firemen, mechanics, shopmen, clerks, agents, telegraph operators, station-men, foremen and laborers, to take effect from April 1st.

Philadelphia and Reading Railroad Company.—The sales in this stock amount to over 17,000 shares at from 25¾ to 23 per cent., closing at 23¾ per cent.

Shamokin Valley and Pottsville Railroad Company.—$1,000 of the 7 per cent. bonds of this company were sold at auction during the week at 95⅛ per cent.

The Pennsylvania Steel Company has declared a semi-annual dividend of $3 per share, payable on the 16th inst.

Lykens Valley Railroad and Coal Company.—The annual meeting of this company will be held on May 7.

Copper Stocks.

Boston, Wednesday Evening, April 11, 1877.

Reported by Wilson W. Fay & Co., Bankers and Brokers, Room 7, Travellers Building, 31 State street

The market continues quite as dull as previous reported, but the undertone seems a trifle better, owing no doubt to the feeling that war in the East is inevitable. Calumet at once feels it, and makes a stride of four points to $185. Quincy is strong at 37 bid, probably no stock could be bought under 38. Copper Falls is stronger, at $3.00. The mine is evidently looking better than it has for a long time, it pays its last month's expenses from its earnings, which it hasn't done for some time before. There is still assessment due on some of the stock, consequently the stock is made to look as weak as possible, until certain parties have gobbled this up. Pewabic is weaker, at 3. Probably the stock that has been sold recently is stock that was opposed to the present management at the late annual meeting, but on the re-election of the old board, it takes its revenge this way. The following is the product for the several mines, for the month of March:

	Tons.	lb.		Tons.	lb.
Calumet and Hecla	1,224	1,270	Pewabic	37	540
Osceola	153		Quincy	101	180
Franklin	125	420			

Gold and Silver Stocks.

New York, Friday Evening, April 13, 1877.

The business on the American Mining and Stock Exchange has been larger during the week under review than the previous one, the sales amounting to 84,340 shares, as against 70,580 shares last week. The total sales of mining shares on the several boards have amounted to 105,300 shares, as compared with 77,220 shares last week. The chief feature of the week has been a bear attack upon the Hukill and Seaton stocks, creating a large short interest in them that in the process of covering will probably ruin some of the operators. The sales of Hukill have amounted to 32,809 shares, opening on the 7th inst. at 3¾; the highest point of the week being 4½, and the lowest (to-day) 2½, finally closing at 4. Our reports from experts, who are quite familiar with the workings of this mine, clearly indicate that the stock has too much intrinsic value to be sold short at 2½, and although the public may not be aware of its value, it will be but a brief time before it will become so. We refer to reports from this mine, which will be found on another page. The sales of Seaton have amounted to 9,400 shares, ranging from 4⅜ to 2⅝, and closing at 3⅜. *Bona fide* investors who have purchased this stock without a full knowledge of its value, will do well to investigate its claims before parting with it at the low prices that have ruled this week. Merrimac, Bertha and Cleveland have been the next most active stocks at prices fairly steady. There has been quite an improved business in the Comstock stocks, although at declining prices in almost all cases.

Our San Francisco Contemporary, the *Stock Report*, comments upon a statement made in these columns, that 'the California stocks are as a rule wisely let alone' in this market and it attributes the ill odor in which these securities stand here to the calumnies of San Francisco papers. In a later issue the *Stock Report* publishes a letter from a New York correspondent who evidently does not relish the advice given by The Engineering and Mining Journal to those proposing to invest in mines, and its denunciation of fictitious sales.

We have a high opinion of our contemporary and beg it to calm itself on the subject of the influence of the San Francisco papers it refers to. The real reason California (we should rather say Nevada, meaning as we do the chief stocks dealt in on the California boards) mining stocks are wisely avoided here, is not because many Nevada mines are not good or highly esteemed, but because the spirit of gambling that has taken possession of those who control them make their stocks entirely unsafe investments for outside capitalists. The value of the majority of San Francisco stocks depends far more on the relative strength of bulls and bears than on the actual condition of the mine; and the officers of the companies keep the public in such profound ignorance of the *actual* condition of the property and use the information they officially possess so universally for their own benefit, at the expense of the stockholders, whose servants and agents they are, or should be, that no prudent capitalist will touch these stocks. They have come to be mere gambling checks in a game where the officers of the companies are the *Croupiers* with immense odds in their favor

We condense the following from the *Gold Hill News*, of the 4th inst. The Consolidated Virginia is yielding 400 tons of ore per day, three-fourths of which is being taken from the 1650 feet level. The bullion yield for March was $517,079, an increase of $188,000 over February. The product for the present month, it is thought, will be ample to pay the usual dividend of $2 per share in May. The California is yielding 500 tons of ore per day. The bullion product for March was $1,830,000, an increase of more than $280,000 over February, notwithstanding a delay of three or four days at the beginning of the month for repairs. The 1650 feet level opened from the C and C shaft has exposed a large amount of rich ore, averaging $300 per ton under the stamps. Ore is being hoisted through this shaft at the rate of 120 tons per day.

Chollar Potosi.—This mine is yielding 115 tons of ore per day, averaging $26 50 per ton. The March bullion yield was $45,914; of this amount $14,111 was gold, and $31,803 silver. The work in the Hale & Norcross mine is confined to pumping the water and repairing the cave in the main incline. The water from the 1900 feet level of the Savage mine is being lowered at the rate of one foot per hour; continued trouble, however, is met with delays in pumping.

COAL TRANSPORTATION AND GENERAL MINING STOCKS.

[New York and Philadelphia.]

	Amount of Cap. Stock.	Shares issued.	Date, percentage and amount of last dividend.	Quotations. g												Shares sold.
				Apr. 7.		Apr. 9.		Apr. 10.		Apr. 11.		Apr. 12.		Apr. 13.	Clg.	
				H'gst.	L'st.	H'gst.	L'st.	H'gst.	L'st	H'gst.	L'st.	H'gst.	L'st.	H'gst.	L'st. Bid.	
‡Consolidation Coal Co.	$10,250,000	102,500	Jan. 1, '77, 2½. $256,250	20	....	20	....	20	....	20	....	20 00	....	....	.... *27	....
‡Delaware and Hudson Canal Co.	20,000,000	200,000	Aug. 1, '76, 4.... 800,000	49½	48¾	49¼	47½	47¾	47⅛	47⅛	36	43¾	40	44	40⅜	42⅛ 51,440
‡Delaware, Lackawanna and W. RR. Co	26,200,000	524,000 c	April 20, '76, 2½. 655,000	59¾	58½	59	57¾	57¾	56	56⅞	50	53	51½	54¾	52¼	53 351,295
§Lehigh Coal and Navigation Co.	10,448,550	208,971 c	Sep. 3, '76, 1½. 156,728	44¾	44	43	42½	42⅛	41¾	42⅛	40½	40⅛	39⅜	....	....	41 15,693
§Lehigh Valley Coal Co.	27,042,900	540,858 c	April 15, '77, 1½ 405,643	82	82	82	80	79½	78	79¼	76	76	74⅜	....	....	75 4,598
‡Maryland Coal Co.	4,600,000	44,000	Jan. 31, '76, 1½. 66,000	8	....	8	....	8	....	8	....	8	....	....	....	8 ....
‡New Jersey Central RR. Co.	20,600,000	206,000	April 20, '76, 2½ 515,000	....	....	8⅝	8⅜	8⅞	8⅜	8⅞	8½	8½	8	8¼	8	8¼ 4,271
‡Pennsylvania Coal Co.	5,000,000	100,000 c	Feb. 1, '77, 5.... 250,000	....	....	....	....	*198	....	*198	....	....	....	....	....	*1 98 ....
§Pennsylvania RR. Co.	68,868,700	1,377,376 c	Feb. 26, '77, 2.. 1,377 374	78½	77¼	78¼	77¼	77½	77	77¼	74¼	74¾	72	....	....	74 109,961
§Philadelphia and Reading RR. Co.	34,278,755	685,575 c	Jan. 18, '76, 2½. †856,969	25¾	25½	26	23½	25½	25	25½	23½	23¾	23	....	....	23¾ 17,283

Total sales of coal stocks for the week. 554,541

MINING STOCKS, New York.

Name of Company.	Location.	Feet on Vein.	Capital Stock	a No. of Shares.	Total Assessments Levied.	Date and Amount of Last Assessment per Share.	Total Dividends paid.	Date and Amount of Last Dividend per Share.	These quotations are in currency, and are so much per share.						
									Sat.	Mon.	Tues.	Wed.	Thurs.	Fri.	
Alpha Cons. G. S.	Nev.	300	$ 3,000,000	30,000	$ 180.000	Aug. 12, '75, $1.	....	.....	....	$12 62½	$11 50	$12 50	$13 75	$12 50	1,300
Am. Flag, G.	Colo.	5,300	600,000	60,000	**	.....	....	.....	....	....	....	....	07	....	....
Belcher. G. S.	Nev.	1 040	10,400,007	104,000	864,400	Feb. 24, '77, $1.	$ 15,397,200	April 10, '76, $1.	....	....	5 50	6 75	6 62½	6 75	600
Bertha, G.	Virg.	645 acs.	300,000	30,000	**	.....	....	.....	$ 8 62½	8 50	8 50	8 37½	8 12½	7 87½	4,800
Best and Belcher, G. S.	Nev.	545	10,080,000	100,800	236,992	Feb. 6, '77, $1.	....	.....	....	26 00	23 37½	24 37½	24 75	23 75	1,100
Bobtail, G.	Colo.	2,500	1,136,630	227,326	**	.....	....	.....	1 55	....	1 40	1 50	1 45	....	1,100
Bobtail Tunnel Co., G	Colo.	..	100,000	20,000j	6,000	July 7, '73, 30c.	20,000	Dec. 15, '76.	4 00	....	....	....	....	....	250
Bullion, G. S.	Nev.	943½	10,000,000	100,000	2,202,000	Jan. 15, '77, $r.50.	...	.....	10 37½	9 50	9 50	9 62½	10 00	....	1,000
Caledonia, G. S.	Nev.	2,188	10,000,000	100,000	1,310,000	Feb. 10, '77, $1.	....	.....	....	....	3 50	....	3 87½	3 37½	600
California, G. S.	Nev.	600	54,000,000	540,000	....	.....	11,880,000	March 15, '77, $2.	47 50	....	....	42 50	44 50	44 25	500
Centennial, G	Cal'f	66 acres	1,000,000	100,000b	....	.....	....	.....	....	....	....	....	....	....	....
Chollar Potosi, G. S.	Nev.	1,400	2,800,000	28,000	1,282,000	June 26, '76, $5.	3,080,000	Feb. 10, '72. $1.	....	....	47 50	....	43 25	42 50	600.
Cleveland, G.	Colo.	3,715	250,000	25,000b	**	.....	....	.....	6 62½	6 50	6 50	6 50	6 50	6 62½	4,200
Cons. Hercules & Roe.	Colo.	16.500	1,000,000	100,000	**	.....	120,000	.....	....	....	....	....	....	....	....
Cons. Imperial. G. S.	Nev.	468	50,000,000	500,000	375,000	March 10, '77, 25c.	....	.....	....	....	1 12½	1 12½	1 37½	1 25	3,200
Con. N. Slope & E. C. T.	Colo.	15,000	500,000	10,000	**	.....	....	.....	....	....	....	....	....	....	....
Cons. Virginia, G. S.	Nev.	710	54,000,000	540,000	411,200	June 11, '73, $3.	25,920,000	Dec. 11, '76, $2.	....	....	37 25	39 50	40 25	39 50	950
Confidence, G. S.	Nev.	130	2,496,000	24,960	243,840	March 18, '73, $1.	78,000	May 1, '65, $8.33⅓	....	....	....	....	....	....	....
Crown Point, G. S.	Nev.	600	10,000,000	100,000	1,273,370	Jan. 10, '77, $1.	11,588,000	Jan. 12, '75, $2.	....	....	5 00	6 25	....	7 12½	600
Douglas Mining Co.	Colo.	21,000	1,000,000	10,000	**	.....	....	.....	....	....	....	....	....	....	....
Eureka Cons. G. S. L.	Nev.	..	5,000,000	50,000	100,000	May 26, '76, $1.	1,000.000	Aug. 5, '75, $1.	20 00	20 00	20 50	20 25	18 62½	....	1,200
Eureka G. Mg. Co.	Cal'f				....	.....	....	.....	....	....	....	....	....	....	....
Exchequer, G. S.	Nev.	400	10,000,000	100,000	280,000	Sept. 23, '76, $1.	....	.....	4 37½	4 87½	3 87½	4 50	10 37½	....	1,200
Gould and Curry, G. S.	Nev.	621	10,800,000	108,000	2,134,000	Jan. 23, '77, $1.	3,934,800	Oct. 10, '70, $10.	....	....	9 00	9 37½	....	....	400
Grant, G. S.	Nev.	1,000	10,000,000	100,000	....	.....	....	.....	....	....	....	....	....	....	....
Granville Gold Co.	N. C.	9,000	1,000,000	100,000	....	.....	....	.....	2 37½	2 37½	2 50	2 37½	2 12½	2 00	1,700
Hale & Norcross, G. S.	Nev.	400	11,200,000	112,000	2,354,000	Jan. 22, '77, $1.	1,598,000	April 10, '71, $1.	3 75	3 50	3 50	3 37½	5 37½	3 25	1,200
Henry Tunnel Co.	Nev.	3,000	2,000,000	80,000	**	.....	....	.....	....	....	5 50	....	6 12½	6 25	800
Hukill, G. S.	Colo.	3,288	1,000,000	100,000b	**	.....	30,000	April 10, '77, 10c.	3 75	3 37½	3 87½	3 50	3 00	4 00	32,800
Indian Queen, S.	Nev.	1,000	3,000,000	60,000c	....	.....	60,000	.....	....	....	....	....	....	....	....
Julia Cons., G. S.	Nev.	3,000	11,000,000	110,000	220,000	Jan. 4, '77, $1.	....	.....	2 75	....	....	....	....	....	200
Justice, G. S.	Nev.	2,100	10,500,000	105,000	1,502,500	Sept. 14, '76, $5.	....	.....	10 50	....	....	....	....	....	100
Kentuck, G. S.	Nev.	95	3,000,000	30,000	270,000	Dec. 3, '74, $1.	1,252,000	March 8, '70, $5.	5 50	5 50	....	....	....	....	400
Kossuth, G. S.	Nev.	2,700	5,400,000	108,000c	405,000	Aug. 15, '76, 50c.	....	.....	....	....	....	....	....	....	....
Lacross G. M. Co	Colo.	3,900	1,000,000	100,000	**	.....	....	.....	30	30	31	33	33	....	18,200
Leopard, G. S.	Nev.	1,500	5,000,000	50,000	50,000	March 31, '76, $1.	162,500	Dec. 15, '76, 50c.	....	3 25	3 00	....	....	....	200
Lucerne Mining Co.	Colo.	4,200	5,000,000	500,000b	**	.....	....	.....	1 50	1 50	1 50	1 37½	1 25	1 12½	2,100
‡Mariposa, pre.	Cal.	44.387	5,000,000	50,000	1,350,000	Feb. 17, '77, $1.	....	.....	....	....	....	....	4 00	4 25	400
" " " com.	"	acres.	10,000,000	100,000	1,350,000	Feb. 17, '77, $r.	....	.....	....	....	....	....	3 00	4 00	200
Mer. & Min. Tun. Co.	Colo.	30,000	500,000	50,000	**	.....	....	.....	....	....	....	....	....	....	....
Merrimac, S.	Mass.	1,500	500,000	50,000b	**	.....	55,000	April 10, '77, 10c.	6 87½	6 75	6 75	6 87½	6 87½	6 75	9,700
Mexican, G. S.	Nev.	600	10,080,000	100,800	100,800	Sept. 5, '76, 50c.	....	.....	13 12½	....	12 12½	....	....	....	400
Morning Star	Nev.	1,600	8,000,000	80,000	....	.....	....	.....	....	....	....	....	....	....	....
N. Y. & Colo., G.	Colo.		1,000,000	50,000	**	.....	20,000	March 1, 17, 20c.	....	....	....	....	....	....	....
Northern Belle, S.	Nev.	1,600	5,000,000	50,000	....	.....	1,100,000	March 15, '77, $1.	....	....	....	23 25	24 50	....	200
Ophir, G. S.	Nev.	675	10,080,000	100,800	2,034,400	May 14, '75, $2.	1,394,400	March 9, '64, $4.	18 50	18 50	....	....	....	....	300
Original Comstock, G. S	Nev.	.. .	10,000,000	10,000	....	.....	....	.....	....	....	....	....	....	....	....
Overman, G. S.	Nev.	1,200	3,840,000	38,400	2,222,280	Oct. 21. '75. $3.	....	.....	40 12½	....	....	....	....	....	800
Pleasant View, G.	Colo	1,200	200,000	20,000b	**	.....	....	.....	....	....	....	....	....	....	....
‡Quicksil. M. Co., pre.	Cal.	8,500	4,291,300	100,000	**	.....	....	.....	....	....	....	....	....	20 00	100
" " " com.	"	acres.	5,708,700	"	....	.....	....	.....	....	....	....	....	13 00	13 75	500
Raymond and Ely, G. S.	Nev.	5,000	3,000,000	30,000	540,000	Dec. 5, '76, $1.	3,075,000	Sept. 10, '73. $3.	4 50	4 50	....	4 87½	....	....	700
St. Joseph, L.	Mo.	2600 acs.	1,000,000	100,000	....	.....	250,000	.....	..	6 00	....	....	....	....	100
Santiago, G. S.	Nev.	2,000	11,200,000	112,000	....	.....	....	.....	....	....	5 00	....	....	....	....
Savage, G. S.	Nev.	800	11,200,000	112,000	3,082,500	Mch. 29, '77, $1.	4,460,000	June 11, '69, $3.	5 50	5 50	....	....	5 25	....	800
Seaton, G. S.	Colo.	1,700	500,000	50,000	....	.....	5,000	April 10, '77, 10c.	4 00	3 87½	3 87½	4 00	3 12½	3 12½	9,400
Seg. Belcher. G. S.	Nev.	160	640,000	6,400	244,800	April 11, '76, $5.	....	.....	....	....	....	....	....	....	....
Sierra Nevada, G. S.	Nev.	3,650	10,000,000	100,000	1,600,000	Feb. 15, '77, $1.	102,500	Jan. 16. '71, $1.	....	....	....	....	....	....	....
Silver City, G. S.	Nev.	3,900	6,310,000	63,100	15,775	Nov. 16, '76, 25c.	....	.....	....	....	....	....	....	....	....
Silver Hill, G. S.	Nev.	5,400	10,800,000	108,000	864,000	Feb. 6, '77, $1.	....	.....	....	....	....	....	....	....	....
South Comstock, G. S.	Nev.	1,500	10,000,000	100,000	54,000	Jan. 30, '77, 25c.	....	.....	....	....	....	....	....	....	....
South. California, G. S.	Nev.	1,500	5,000,000	50,000	....	.....	....	.....	....	....	....	....	....	....	....
Southern Star. G. S.	Nev.	1,500	6,000,000	600,000	....	.....	....	.....	....	....	....	....	87½	....	200
Trenton, G. S.	Nev.	..	10,000,000	100,000	....	.....	....	.....	....	....	....	....	....	....	....
Union Cons., G. S.	Nev.	850	10,000,000	100,000	260,000	March 3', 76, $1.	....	.....	....	....	....	....	....	....	....
West Belcher, G. S.	Nev.	1,000	10,000,000	100,000	....	.....	....	.....	....	....	....	....	....	....	....
Yellow Jacket, G. S.	Nev.	1,200	12,000,000	120,000	2,838,000	March 2, '77, $1.	2,184,000	Aug. 10, '71, $2.50.	....	....	....	....	....	....	....
Young America, S.	Nev.	1,000	3,000,000	30,000	6,000	Oct. 23, '76, 20c.	....	.....	....	....	....	....	....	....	100

Total Assessments levied to date, $31,362,357 | Div'ds pd. to date, $88,766.400 | Total sales of Mining Stocks for the week..... 105,300

Boston.

									Apr. 6.	Apr. 7.	Apr. 9.	Apr. 10.	Apr. 11.	Apr. 12.	
Allouez, c.	Mich.	..	$1,000,000	20,000c	$ 940,000	May 9, '76, $5.	....	.....	8 00	8 00	7 00	7 25	7 00	....	.. ...
Calumet Hecla, c.	Mich.	2¾ mile	2,000,000	80,000d	1,200,000	.....	$ 11,450,000	Feb. 15, '77, $5.	181 00	182 00	182 25	183 50	185 00	....	.....
Central, c.	Mich.	..	500,000	20,000d	100,000	June, '62, 65c.	1,160,000	Feb. 6, '77, $7.	....	34 00	34 00	34 00	34 00	....	.....
Copper Falls, c.	Mich.	..	1,000,000	20,000c	535,000	May 10, '76.	100,000	Nov., '71, $1.	2 75	2 62½	2 75	2 87½	3 00	....	.....
Dana, c.	Mich.	..	500,000	20,000d	68,000	Jan., '73, 50c.	....	.....	10	10	10	10	10	....	.....
Dawson, s.	Ont., C.	..	1,200,000	60,000f	....	.....	....	.....	14	14	13	12	12	....	.....
Duncan, s.	Ont., C.	..	1,200,000	60,000f	75,000	July, '76, 41 2-3.	....	.....	5 50	5 37½	5 50	5 62½	5 62½	....	.....
Franklin, c.	Mich.	..	500,000	20,000d	360,000	June, 68, $5.	585,000	Nov., '71, $1	11 25	11 37½	11 25	11 25	11 00	....	.....
Humboldt, c.	Mich.	..	500,000	20,000d	100,000	Sept. 28, '76, 15c.	....	.....	20	20	20	20	20	....	.....
International, s.	Ont., C.	..	1,200,000	60,000f	....	.....	....	.....	62½	56¼	56¼	50	50	....	.....
Madison, c.	Mich.	..	500,000	20,000d	123,000	Sept. 11, '74, 10c.	....	.....	25	24	24	22	20	....	.....
Mesnard, c.	Mich.	..	500,000	20,000d	160,000	April 12, '65, 50c.	....	.....	37	37	35	35	35	....	.....
Minesota, c.	Mich.	..	1,000,000	20,000c	436,000	Juue 10, '69, $1.	1,820,000	March 15, '76, 50c.	1 12½	1 00	1 00	1 00	1 06¼	....	.....
National, c.	Mich.	..	500,000	20,000d	195,000	Oct., '75, $1.	360,000	Oct., '73, $1.	90	90	90	90	90	....	.....
Osceola, c.	Mich.	..	1,000,000	40,000d	880,000	May 1, '76, $2.	....	.....	23 75	23 50	24 00	23 50	24 00	....	.....
Petherick, c.	Mich.	..	500,000	20,000d	165,533	March 22, '76, 50c.	....	.....	22	22	22	22	20	....	.....
Pewabic, c.	Mich.	..	500,000	20,000d	185,000	June, '68, $3.	460,000	July, '73, $1.	2 87½	2 31¼	3 00	2 87½	2 75	....	.....
Phœnix, c.	Mich.	..	1,000,000	20,000c	817,500	Sept., '70, $3.	20,000	Jan. 20, '76, $1.	...	....	....	....	....	....	.....
Quincy, c.	Mich.	..	h 200,000	20,000b	....	.....	2,130,000	Feb. 15, '77, $4.	36 75	37 00	37 00	37 25	37 25	....	.....
Ridge, c.	Mich.	..	500,000	20,000d	200,000	.....	90,000	Feb. 8, '75, $1.	2 37½	2 50	2 75	2 75	3 00	....	.....
Rockland, c.	Mich.	..	500,000	20,000d	495,000	Jan., '74, $1.	....	.....	25	20	20	20	20	....	.....
Star, c.	Mich.	..	500,000	20,000d	265,000	March 30, '76, 50c.	....	.....	20	20	20	20	20	....	.....
Superior, c.	Mich.	..	500,000	20,000d	340,000	March, '74, 25c.	....	.....	10	10	10	10	10	....	.....

Total Assessments levied to date.... $7,640,033 | Div'ds paid to date, $18,175,000 | Total sales..... — shares

G. Gold. S. Silver. L. Lead. C. Copper. *a* The par value of shares is $100, unless otherwise designated. *b* Par value $10. *c* Par value $50. *d* Par value $25 each. *e* Par value $15. *f* Par value, $20. *j* Par value, $5 00. Prices asked will have a * affixed. *g* For readiness of comparison the quotations of Philadelphia Stocks the shares being $50 each, are based upon a per centage value, or 100, equal to shares of $100. *h* Full paid. *i* On the four old companies. † This company declared a dividend of 3⅜ per cent. on its preferred stock in July, 1876. ‡ New York Stock Exchange quotations. § Philadelphia Stock Exchange quotations. ** Non-assessable.

The Chollar-Norcross-Savage shaft is now within 450 feet of the Sutro tunnel level, and will probably reach that depth long before the tunnel is likely to reach the ledge. This shaft is calculated to prospect the lode to a depth of 4,000 feet, or about 2,300 feet below the level of the Sutro tunnel. In this enterprise the Chollar-Potosi company holds an interest of 1,400 shares; the Hale & Norcross 400: and the Savage 800 shares. The shaft has four compartments, three of which are for hoisting, and are 5 x 6 feet in the clear, and one for pumping, which is 6 x 7 feet in the clear. To construct this shaft to make room for the necessary timbers, an excavation 10 feet in width by 30 feet in length is required. Tests have been made with the present hoisting apparatus, which prove that 2,400 tons of rock can be hoisted with ease from a depth of 2,000 feet every 24 hours.

Justice continues her large ore yield. The March product was greatly in excess of that of any month for the past year. Water has been struck in the Ophir mine, and the principal work being done, is making preparations to pump it out, only 30 tons of ore, averaging $35 per ton being taken out per day. Belcher is yielding 90 tons per day from the old upper ore stopes on the 1,000 and 800 feet levels.

We glean the following from our exchanges published near the respective mines:

Eberhardt and Aurora Silver Mine, Nev.—The ore chamber in this mine is enlarging and the ore body looking quite favorable; so much so that some of the miners previously discharged have been put to work again. The monthly expenditures of the company amount to about $10,000.

The Hite Gold Mine, of Mariposa Co., Cal., shipped $28,627.70 in bullion on March account.

The New Coso Silver Mine, of Inyo Co., Cal., produced $97,120 in bullion during the month of March against $53,100 for February.

The Peck Silver Mine, of Arizona, is producing bullion from a free milling ore at the rate of about $1,500 per day. The shaft of this mine is down 300 feet, and the appearance of the ore deposits very encouraging.

The Cerbat Mine, in Mohave Co., Arizona, is producing a limited quantity of ore, which assays $100 in gold and $50 in silver to the ton.

The Grand Prize Mine, of the Tuscarora district, Nev., is shipping bullion at about the rate of $75,000 per month. This company keeps a 10-stamp mill in constant operation and have lately contracted for a new 60-stamp mill.

Rattlesnake Mine.—A very rich strike is reported to have been made in this mine which is located a few miles north of Tybo, Nevada. The ore is said to mill $1,000 to the ton.

Rumley Silver Mine, Butte, Montana.—A rich strike is reported in this mine at the bottom of the 200 feet shaft. The ore body tapped is twelve feet wide, and free from extraneous substances, and richer than any heretofore found in the mine.

The Monarch Mine, at Rocky Bar, Idaho, made a recent bullion shipment of $6,000.

The Eureka Gold Mine, of Grass Valley, Cal., is producing gold amalgam at the rate of nearly 300 ounces per week.

The Gold Hill Mining Company, of Boise Co., Idaho, employs 75 men crushing from 40 to 45 tons of quartz every twenty-four hours, the average yield of which is probably $15 per ton.

The Phœnix Gold Mine, of Amador Co., Cal., is producing a regular supply of quartz, keeping eighty stamps constantly receiving. The company employ 145 men.

The Paymaster Silver Mine, is located in the White Pine district, Nevada. A rich strike has been made in this mine on the 162 feet level, the assays running from $150 to $400 per ton.

The Eureka Consolidated Mine is producing ore which averages $40 in silver per ton, and from 18 to 20 per cent. in lead.

The Exchequer Gold Mine, of Silver Mountain, Cal., is producing paying ore at the rate of from twenty to twenty-five tons per day.

The New England Gold Mine Nev., gave a recent yield from 98 tons of rock, of $3,294 in free gold from batteries and plates, including 7 tons of sulphurets, which yielded by chlorination process the last time, at the rate of $152 to the ton. This will give the yield of the rock as it left the mine, at about $43.50 per ton. The 75 tons worked previous to this, yielded $60.92 to the ton. The ledge this time was considerably larger than before, and hence paid less to the ton, but the profit in taking it out is about the same.

The Leeds Silver Mining Company, of Silver Reef, Nev., is producing $1,500 per day, working from 20 to 25 tons of ore.

The Northern Belle, Manhattan, Leopard and Modoc Consolidated, are making regular shipments of bullion.

The sales at the New York Mining Stock Exchange, this week, have been more active than for some weeks past, footing up a total of 21,100 shares as against 12,500 in our last issue, Lacrosse, as usual, being the main feature, of which 18,200 shares were sold at prices ranging from from 29c. to 33c. closing at the latter figure, an advance of 5c. Quotations remain about the same, though a slight decline is noticeable in some of the stocks.

Sales and closing quotations of copper stocks are as follows:

Atlantic	375	shares@6.87½-7	
Calumet & Hecla	25	"	@$182.00
Franklin	150	"	@$12
National	200	"	50c@62½c.
Pewabic	100	"	@$3.00

Closing Quotations.

	Bid.	Asked.
Allouez Copper	6 00	10 00
Atlantic "	6 87½	7 25
Calumet & Hecla	183 00	186 00
Central	34 00	38 00
Franklin	10 50	12 50
Madison	20	30
Mesnard	....	62½
Minesota	....	....
National	50	87½
Osceola	23 00	28 00
Pewabic	2 50	3 50
Quincy	36 00	....
Ridge	....	4 00
Rockland	....	....

Salt Lake Ore and Metal Market.

Telegraphic advices from Salt Lake City, of a recent date, report no change in the prices for base bullion and argentiferous lead ores. The following quotations are nominal.

Argentiferous Lead (Base Bullion).—$74 per ton for lead. $1.20 per ounce for silver. $20 per ounce for gold. The quotations for silver is based upon the silver contents in the lead of 70 ounce per ton of 2,000 lb.

The *Inter-Ocean's* correspondent, under date of the 4th inst., says: There are sales of twenty tons of bullion to report at $74.50 per ton for lead, and $1.19 per ounce for silver. The bullion will average about sixty ounces of silver, and a half ounce in gold.

The transportation of ores in the Cottonwood and Parley Park, owing to the storm, is almost entirely suspended.

The market in ore and bullion extremely dull with a downward tendency. The reports from the mines in the different districts are flattering for a big yield for the year.

The southern part of the Territory, heretofore contributing but little, will add considerable. Leads still hold out, and new discoveries are reported. The sandstone silver ores, that miners and operators distrusted, are increasing in favor with both parties.

Shipments of ore and bullion east, for the week ending the 31st ult., were as follows: To Omaha, 23 cars bullion; New York, 10 cars; St. Louis, 9 cars; Newark, 1 car; Pittsburg, 11 cars lead ore: Sacramento, 11 cars; San Francisco, 10 cars; Baltimore, 1 car copper ore; total bullion, 1,130,323 pounds, lead ore 659,253 pounds, copper ore 21,300 pounds; grand total, 1,810,876 pounds.

The Summit County Railroad has been purchased by the Union Pacific, and is to be extended to Parley's Park mining district, where it will meet a great necessity and increase the present business of this road very much.

Gas Stocks.

New York, Friday Evening, Apr. 13, 1877.

Gas stocks are very quiet and without features. We lightly advance the quotations of the Brooklyn Company and the Metropolitan of New York.

New York Gas Company.—37 shares of the stock of this company were sold at auction during the week at 136½.

Buffalo (N. Y.) Mutual Gas Company.—250 shares of this stock, par $100, were sold during the week at 55½.

Williamsburg (N. Y.) Gas Company.—$5,000 of the 7 per cent. scrip stock was sold at auction during the week at 101½.

Newburgh (N. Y.) Gas Company.—The price of gas here has been reduced to $2.50 per thousand. This was brought about by the proposal of parties to introduce a new gas company into the place.

San Francisco Gas Company.—This stock has materially declined, recent sales having been made at $106 per share.

Johnstown, Pa.—The cost of lighting the streets of this city amounts to about $1,800 per year.

Port Jervis, N. J., is now paying $3.50 per thousand for gas.

Newark, N. Y.—The new tax ordinance of this city which has passed to its third reading, appropriates $80,000 for lighting the streets for the ensuing year.

Wakefield (Mass.) Gas Company.—This company has declared a dividend of $3 per share.

The Municipal Gas Company, of New York, has called a special meeting of its stockholders on the 7th of May, the object of which is to increase the capial. stock of the company from $1,000,000 to $1,500,000, This company manufactures gas under the Tessie du Motay process (water gas).

The following list of Companies in New York and vicinity are corrected weekly by George H. Prentiss, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Companies in New York and vicinity.	Cap. Stk.	Par.	last Divid.	When Paid.	Bid.	Askd.
			pr c			
Mutual, N. Y.	$5,000,000	$100	2½	Apr. '77	98	100
" " Bonds	90,000	1,000	*3½	Feb. '77		107
N. York "	4,000,000		5	Nov. '76	131	135
Metrop. "	2,500,000	100	5	Sep. '76	137	141
" " Certf.	1,000,000	....	3½	" "	102	—
" " Bonds	500,000	1,000	3½	Dec. "		102½
Harlem "	1,850,000	50	4	Feb. '77	104	—
Manhat. "	4,000,000	50	10	Dec. '76	215	220
Brooklyn, B'klyn.	2,000,000	25	5	Nov. '76	170	172½
Nassau, "	1,000,000	25	4	Jan. '76	80	—
" " Certf.	700,000	1,000	3½	Nov. '76	95	—
People's, "	1,000,000	10	3½	Jan. '76	50	—
" " Certf.	300,000	1,000	3½	July '76	84	90
" " B'ds	325,000	....	3	Feb. '77	90	96
Metrop. "	1,000,000	10	3½	Nov. '76	78	80
Wmsb'rg "	1,000,000	50	3	Oct. '76	130	—
" " Certf.	1,000,000	....	3½	July "	100	102
Citizen's "	1,200,000	20	2½	Jan. '76	95	99
" " Certf.	320,000	1,000	3½	Oct. "	98	102
J. C., N. J.	750,000	20	5	July '75	160	—
Cent. Westch. N. Y	466,000	50	4	July '77	85	90
Subur'n " "	295,000	50	3½	Oct 1 '76	00	100

*Gold.

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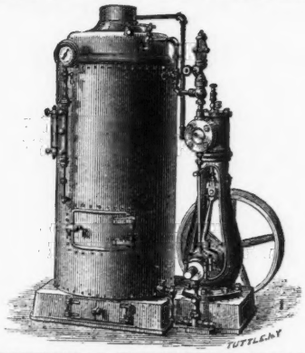

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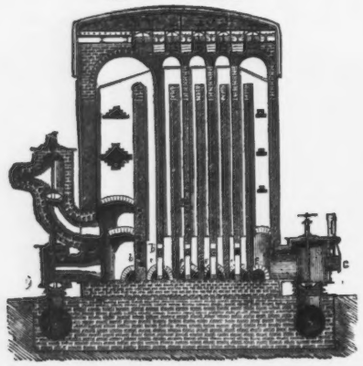

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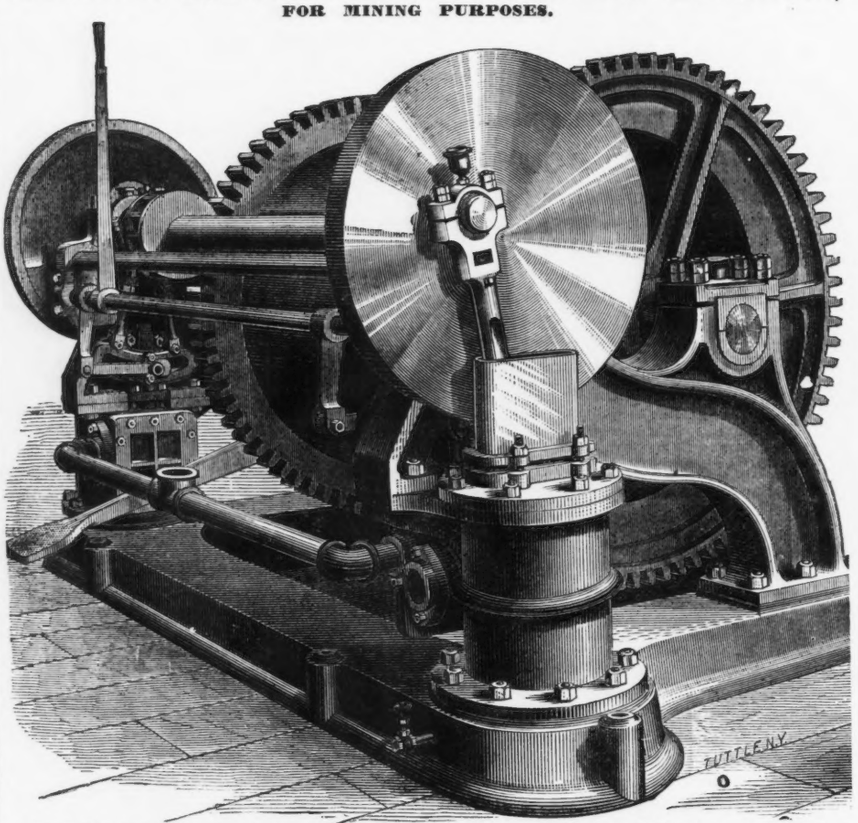
FOR MINING PURPOSES.



This Engine is designed for use in mines, and is intended for very quick work. It is furnished with two steam cylinders, which are single geared to a large winding drum. It has **Link Motion** for reversing, so that two buckets or platforms can be operated, one ascending while the other descends. **The Drum can be made of any size, diameter or length, to suit Hoist.**

These Engines are tested before leaving the works, and are shipped in complete working order, and require but little skill, if any, in erecting or keeping in order.

They can be run with either STEAM or COMPRESSED AIR.

The speed attained is from 200 to 500 feet per minute. Every part is made extra strong, well fitted and of the best material. In writing for information, as regards prices, etc., state length or height of hoist, amount of weight, and at what speed to be lifted.

References:—Va. Con. Mining Co., Virginia City, Nev.; California Mining Co., VirginiaCity, Nev.; Manhattan Mining Co., Austin, Nev.; Hermann Mining Co., Georgetown, Colo.; Winnamuck Mining Co., Salt Lake, Utah; Chicago Silver Mining Co., Salt Lake, Utah; Union Con. Mining Co., Tennessee.

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